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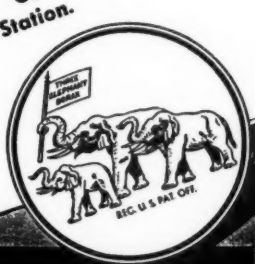

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The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: 1102 16th Street, N. W., Washington 6, D. C.

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Well-watered Christmas Trees

Better Crops with PLANT FOOD

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VOL. XXXV WASHINGTON, D. C., DECEMBER 1951 No. 10

Look back, and . . .

You'll Remember Yule

Jeff McDermid

WHEN Christmas comes, it stirs up inside a guy's soul a lot of feelings which are sort of reflections of the bright and dazzling hopes that you had as a kid up there in our old valley. For one thing, it reminds you forcibly that maybe you never made out to do all the good and brave and self-sacrificing deeds that a kid yearns and dreams of doing—not because of any Christmas gifts in the offing—but just because you went to high school and learned a little here and there in a sketchy way about fellows of fact and fiction who went around helping others and lifting the fears and burdens from hungry stomachs and weary hearts.

You remember how we read Ivanhoe, and The Great Stone Face, and the Idylls of the King, and the Dickens books about the child's dream of a star, about Tiny Tim and Bob Cratchett, and that noble man who held the hand of the timid little innocent seamstress on the way to the guillotine in Paris during the Terror—Sidney Carson, who gave his life to make a woman whom he loved happy.

Then there are memories of stories about Friar Tuck and those other mountain monks with their shaggy dogs, who rescued tired travelers amid the Alpine snows. Other boyhood heroes are recalled, such as Sir Launcelot and his high career amid the plumes and his lofty purpose of knighthood in its flower, and Miles, the dashing friend of the "pauper prince" in his tumultuous adventures in the fens of London. And, of course, some of the nicest Bible characters gave you deep rever-

ence for living well and living honorably—like David and Jonathan, Ruth and Boaz, and the Wise Men of the East and the Life they came to usher into a sad and bitter world so that men might find their narrow pathway bright and beautiful.

Yes, and even a few of the mighty men of American history were your lodestars, too. You tried to see yourself as Washington, or Lincoln, or Thomas Edison, Marcus Whitman, or Robert E. Lee. The list also included some members of your own family of past generations who did so much with so very little to ease the cares of neighbors, and raise the orphans, and build little churches and lonely schoolhouses out in the wilderness, so that nobody might say they had not contributed in their brief and rugged lives to the foundation stones of liberty and knowledge and truth and reason.

YOU used to ponder there by yourself near the dancing firelight of mother's kitchen or under the evening hanging-lamp, wondering what manner of man you would finally be and if perchance some happy traits of inheritance or environment might clothe you also with just enough stamina and faith to make you a doer of decent and dutiful things that would leave the community a trifle better for your having lived there awhile in the valley.

You did not in those tender times have the awful sense of quick urgency which haunts you as the middle years start to throw long shadows far behind them. To you of the youthful dream, tomorrow was "tomorrow," and the years ahead a waving stretch of beckoning highways. You seldom stopped to think that life means just one journey, one chance, one search only for the treasure at the rainbow's end, and only one seedtime in which to make a harvest. To you there were no mental reservations about the "gone years," the "now years," and the "maybe years." To your fervid dreams came nothing but the song of the birds and the hue of the flowers—for the time of the locust and the pestilence was yet to be.

One of the best farmers in our valley, who knew that his days were numbered after decades of heavy labor, aroused himself in the last springtime of his life and asked to be taken daily to the edge of the plowlands to see his son and the hired man prepare the soil and seed the crop. He wanted them to be diligent and painstaking, to use the best tested seed, to direct the plowing so as to halt erosion, and mix into the topsoil the right proportions of mineral fertilizer and lime. All summer long he went out to scan the fields and stimulate his hopes; and he must have realized then, as we ourselves do in time, that this was a symbol of the short span of man's normal destiny, in which the task one performed stood as his "grade mark" forever.

NOW if we compare our own achievements with those of other fellows from our valley only on the grounds of bank stock and other tangible property, we probably won't get all the flavor we can out of the Christmas dish. But we should study up what old chums did for community betterment, and use that as a kind of test to find out the butterfat content of our own milk of human kindness. Then when we get to compare the tests carefully, we'll see that certain attitudes and stubborn ideas we held too firmly have stood in our way considerably.

Number 1 stumbling block was our idea that we must never butt into other people's private affairs, leaving that to the civic do-gooders and organized charities and inquisitors. Well, when our valley was first settled they did not carry their rugged individualism quite that far. You were not supposed to tell a man how to vote or whom to marry or how many kids to have or how to raise them—but if anybody down the road a piece got real sick

and famished and downtrodden, there was usually some neighbor on hand to "succor the sucker."

Even though we did have a poor farm nigh us, as well as a place to lock up criminals (if they weren't in too big a hurry to get out), our valley folks always pitched in and tried to help unfortunate neighbors and keep them away from trouble and despair as long as possible. None of us were psychological professionals or social science ex-

perts, such as the poor and the lazy find necessary nowadays for their rejuvenation. I know we blundered a lot and did clumsy things in our home-grown charity, but by gracious, we were right in on the scene anyhow and had things first-hand. The real trouble is we pray and perform good words and deeds by proxy these days—and then grumble because the Office of Price Stabilization doesn't put a lower ceiling on the price we must pay for somebody's poverty through the community chest.

There are lots of mixed-up reasons also why we are often slow and reluctant to make personal contacts with the "reliefers." It may be social pride, indifference to others, strict attention to our own cares and business affairs, and the reaction of inflated costs and values on our pivate means and inclinations.

So in this manner the intervening years have hastened by us and found us sadly lacking in many of those ambitious longings and juvenile romanticisms. Of course, we have done a stint or two of devoted service now and then—mostly in between the demanding cares of a none-too-successful family man. We have excused ourselves with the thought that at least the parish has not been obliged to see us through with relief donations and organized charity doles. We take some credit, and rightly so, on our ability to maintain an independence that the government says is part of the American heritage. It is nothing to be dismissed lightly at that, seeing as how no small part of the decadence and poverty all around us is due more or less to laziness, laxity, and bad planning.

WE have prepared ourselves by diligence and study for some sort of contribution to society which keeps us in spending money and self respect. But the thing we most often overlook in casting up the score that way is that some others do not have either good health or a fair share of opportunity. Maybe part of our social obligation here is to give some aid to others whose environment and chances for success and comfort have not been within the average for our country.

I am much heartened by the almost unanimous endorsement of our people today for the various public assistance programs in effect for the aged, the blind, the motherless, and the indigent. They say these dependents on assistance programs—not to be confused with the regular social security insurance deal—are growing in numbers and taking up a larger amount of financial support than ever. Part of this extra cost is traceable to inflation and part to the fast pace we run in American life. The existence of so much dependence in the midst of the highest income level in our history means that we have been ready and willing to enact laws which provide the funds rather than to let vicious anti-democratic elements say that we celebrate Christmas with selfish hearts and pagan indifference.

At this time of the season likewise we often consider the evils that have

(*Turn to page* 49)

Photo by author.

Fig. 1. Turkish shepherd, interpreters, and Mission group in pasture near Eskisehir, Turkey. Shepherd says the pastures aren't as good as they once were.

Grassland Farming in the Mediterranean Area

By Ford S. Prince

Agronomy Department, University of New Hampshire, Durham, New Hampshire

"GRASSLAND farming" in the world received further emphasis last winter when a survey team was selected to study the present status of pasture and fodder crops in the Mediterranean area and make recommendations for their improvement. The survey was limited to those countries that have participated in the Marshall Plan or to segments of those countries which lie within the sphere of the Mediterranean climate. There is no reason why the recommendations that were made would not apply to other countries in the Mediterranean area, such for example, as Spain and Yugoslavia.

The survey was under the immediate supervision of the Marshall Plan countries, which is known in Europe as the Organization for European Economic Cooperation, or OEEC. The Food and Agriculture Division of this organization was responsible for the organization of the project. The expenses of the survey party were borne from counterpart funds belonging to the countries surveyed. Workers from Italy were especially insistent that such a survey should be undertaken.

The survey team which was selected was composed of Dr. O. S. Aamodt, Principal Agronomist of the Division of Forage Crops and Diseases, U. S. Department of Agriculture, whose ex-

perience in the States and on similar missions elsewhere proved invaluable to the group; Dr. R. O. Whyte, of England, Editor of the British Grassland Journal, who was chosen by FAO to serve as their representative on the Mission; Mr. C. M. Donald, Principal Research Officer of the Division of Plant Industry of Canberra, Australia, and Dr. John W. Roland, Principal Pasture Research Officer of the South African Department of Agriculture, Pretoria, representing their respective governments. Dr. William Davies, Director of the Grassland Research Station, Stratford-on-Avon, Chairman of the Grassland Working Party for the 16 nations which comprise the OEEC, served on the survey through Italy; and his Assistant Director, Dr. T. Williams, joined the party which surveyed French North Africa and Portugal. The writer was the other member of the Mission, and the second representative of the United States, with Dr. Aamodt, in the group.

We were particularly fortunate in having Mr. Donald and Dr. Rowland on the Mission since their experience had been in climates similar to that of the Mediterranean. Dr. Whyte was a fortunate choice for this group also, since he had made a similar survey of the Island of Cyprus some years ago. Dr. Aamodt has had wide experience and is well acquainted with the "Mediterranean" climate which prevails in southern California, with its peculiar grassland problems. For my part, I had often heard about, but had never seen, the "blue" Mediterranean which is so blue because the sun shines most of the time, so that the climate is actually characterized by a paucity of precipitation. This is especially true of the lowlands of the region.

Actually, the climate of the area is intermediate between the humid climate of northern Europe and the desert conditions of the Sahara to the south. The summer is always characterized by drought, which is more intense at lower elevations, while winter precipitation is more nearly like that of northern Europe with rain-bearing winds from the ocean. At lower altitudes, then, the winters are mild and wet; the summers hot and dry. At higher altitudes, the precipi-

Photo by Dr. Rowland.

Fig. 2. Mediterranean Grasslands Study Mission. Left to right: Dr. J. W. Rowland, South Africa; Mr. C. M. Donald, Australia; Dr. O. S. Aamodt, USDA, Beltsville, Md.; the Author; and Dr. R. O. Whyte, Norfolk, England.

tation is greater; and having cooler temperatures, the rainfall is more effective. "Winter rainfall, summer drought" adequately characterizes this climatic pattern, although the intensity of rain or drought depends largely upon the altitude and the distance from the Mediterranean Sea. The total annual rainfall varies from 8 to 40 inches for the region as a whole.

Outside of the area under irrigation, and there are many actual and proposed irrigation developments, the agriculture is based upon the production of winter annual crops, such as wheat and other small grains. Seedings of crops for fodder and pasture are usually made in the autumn for harvesting in spring or for pasture during the winter and spring months. The production of pasture and fodder for the dry summer, therefore, is as important to the animal husbandry of the region as is the production of winter feed in the northern part of the United States.

Since ancient times, shepherds have pastured their herds and flocks during the winter months on the warm, low-lying plains land, but have taken the animals to the hills or mountains where the weather is cooler and there is more effective rainfall for summer production. This movement still continues in many parts of the area, and the black tents of the Kurds and Nomads are characteristic of many landscapes.

In one respect, at least, and it seemed to me this fact tended to counter-balance the peculiar climatic pattern, the peoples of the Mediterranean are fortunate in that most of their soils are formed from limestone. Furthermore, with the scanty rainfall the soils at lower altitudes are not leached to any extent, except in the marsh lands. The net result is that many soils in the area have a pH value of above 7.0, so that liming is unnecessary. At higher elevations, where there has been much leaching, and especially on soils formed from granite, gneiss, or mica schists, the soils are acid and need lime for high production. Unfortunately, where the soils are acid there are no lime deposits, hence there is a transportation problem if liming is practiced. Soil surveys are not available for most of the countries, and so it would be rash, probably, to guess as to the extent of neutral or alkaline soils. However, in the low and plains land, which is most heavily farmed, it is quite possible that 90 per cent of the soils are alkaline or nearly so, the acid soils lying for the most part at higher elevations and often on sloping land in the hill and mountain areas or in some of the reclaimed marshes.

The Need for Fertilizer

From the standpoint of fertilizer nutrients, the need for phosphoric acid is most acute. All of the fertilizer trials observed by the Mission in Italy, Turkey, and Greece indicated that a deficiency of phosphoric acid was limiting the production of cereal crops to a marked degree. In some instances, on the central Australian plateau in Turkey, as little as 10 pounds per acre of ordinary superphosphate brought a tremendous response in the growth of wheat. With such a deficiency of phosphorus and judging by the response on wheat, it seems almost certain that legumes will respond to phosphorus and that for high fodder or pasture production particular attention should be paid to the use of superphosphate.

Fortunately for the area, there are extensive deposits of phosphate rock in North Africa, and these, coupled with huge sulfur reserves in Sicily, assure the region as a whole that there need be no shortage of phosphate supplies. This is not to say that Turkey and Greece have ready access to either the sulfur or the phosphates, except as they have goods to exchange for them. But the potential supply is there and if the need is as urgent as appears, the demand can and should be met.

The need for potash in the Mediterranean area was said by soils men not to be acute. This was particularly indicated for the soils formed from limestone and those not heavily leached. At higher elevations, however, where

more leaching has occurred and especially on soils formed from granite, gneiss, and mica schist, it is very likely that a need for potash will be discovered when experiments are tried in these areas or when attempts are made to produce legumes which have a higher potash requirement than most other field crops.

The potash resources of Europe, such as those in Alsace-Lorraine in France or Stassfurt in Germany, are adequate to supply the needs of the Mediterranean area for some time to come, along with the other demands that are made upon them.

Except for a few minor deposits of potassium nitrate on the arid Central Plateau in South Turkey, there are no natural nitrogen resources in the area. Some ammonia is recovered as a by-product from the coking process and, of course, France and Italy have synthetic nitrogen plants in operation. There is tremendous need for an expansion in the production of synthetic nitrogen to supply the needs of Greece and Turkey, particularly, and perhaps of other Mediterranean countries. The two plants in operation in Italy produce cyanamid, and since this type of nitrogenous fertilizer is better suited to separate application than to use in mixed fertilizers, there could well be an expansion of synthetic nitrogen facilities in that country, especially of plants that use the ammonia process.

Greece is sorely in need of nitrogenous fertilizers, which must now all be imported. A plant in that country that would synthesize air nitrogen would be a boon to the agriculture there. In both Italy and Greece, the pressure on the land because of the density of population is tremendous. Fertilizer nitrogen, reasonably priced and judiciously used, would increase the food supply of these hard-pressed peoples.

The pressure of population on the land in Turkey is not so great as it is in Greece or Italy. Like Greece, there is no synthetic nitrogen plant in Turkey. Some sulphate of ammonia is produced as a by-product and some nitrate of soda is imported. The use of fertilizers in Turkey is really in the beginning stages, and although since the last war such use has increased fivefold, the principal fertilizer so far

Photo by UNH Photo Visual Service.

Fig. 3. A modern ladino clover pasture in New Hampshire. This is introduced to contrast with the Turkish pasture in Fig. 1 which, along with other permanent pastures in the Mediterranean area, has never been subjected to improvement methods.

utilized is superphosphate. Most of the fertilizer used in Turkey is applied to sugar beets and cotton. The use of fertilizer on wheat is just beginning, and so far as pastures and forage crops are concerned none has so far been used.

As a matter of fact, nowhere in the Mediterranean did we find any permanent pastures that had ever been fertilized. Legumes that are produced for hay or silage, which follow wheat, usually, in some rotations, are sometimes fertilized but are more often grown on the residues of plant food from the wheat crop or on that which is available in the soil.

Lack of appreciation of what fertilizers will do on forages is no doubt responsible for this fact. Another hindrance to fertilizer use on forages, and in fact on all other crops, is their high price. In one of the recommendations of the Mission, we stated that fertilizer prices are too high in these countries and that a price policy should be developed to make fertilizer available to farmers at reasonable cost, particularly for use on pasture and fodder crops. This recommendation was directed specifically to pasture and fodder crops since the increase in production of these crops was the primary objective of our mission.

The need for attention to fertilizer prices in the Mediterranean countries has been emphasized also by the report of the Fertilizer Committee of the OEEC.[1] In this report, the average prices of fertilizers to farmers for 15 of the 16 OEEC countries are listed. Greece was listed in this report as having the highest cost of potash and superphosphate. Portugal had the highest cost of nitrogen, was next to Greece in potash prices, but subsidizes the cost of superphoshate to farmers. Italy was third from the highest in fertilizer prices for all three ingredients among the 15 countries. According to the data, nitrogen prices were 60 per cent higher in Italy than in the lowest non-subsidy country, while superphosphate and potash prices were about 50 per cent higher than in the lowest non-subsidy country. Strenuous measures are needed to remedy such a situation, either by subsidies or by the breaking up of monopolies, if such exist, or both.

I made this statement at the final conference which was held in Rome, "The soils of the Mediterranean are not producing the yields of which the environment is capable." High fertilizer costs to the farmer, the lack of appreciation among governments as to the need for fertilizer subsidies to increase food production, the lack of legume production to add to the nitrogen supply on most farms—these are some of the reasons why yields are no higher than they now run.

The Use of Manure

The use and care of manure in Italy, Greece, and Turkey vary widely. In northern Italy, there seemed to be a keen appreciation of the value of manure. Most of the manure on the farms visited there is composted with superphosphate and allowed to stand in well-constructed compost piles for a year before being applied to the soil. Wells to save the liquid portion are commonly found in the area.

Composting manure in this manner is an admission of the shortage of nitrogen since it is well known that strawy manure applied directly to the soil may need to be supplemented with nitrogen to avoid temporary harmful effects. On the other hand, even with superphosphate added, there is much loss of nutrients from composted manure, especially of nitrogen and potash.

In Greece, it appeared that farmers treated their manure supply with some indifference. In many places, piles of manure not in compost heaps were observed on the edges of the fields, but not being utilized for current crop production.

On the Central Plateau in Turkey, manure produced on the farms is care-

[1] Fertilizers in Agricultural Recovery Programmes. OEEC Paris, 1950.

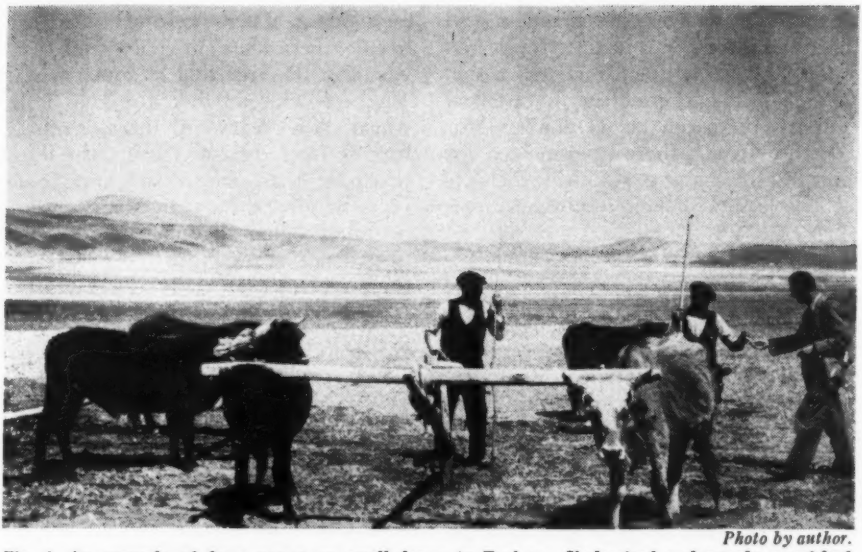

Photo by author.

Fig. 4. An example of farm power on small farms in Turkey. Undersized and poorly nourished cattle speak of the need for more and better fodder crops. Note that these two farmers have brought a "spare" in case one of their animals gets overtired.

fully saved and used as fuel. None of the plant food except that which is in the ashes is returned to the soil. To be used as fuel, the manure is collected, moistened, molded into bricks of varying shapes and sizes (to fit the owners stove, perhaps), and used for cooking or heating. This "Tezek," as the farmers call it, burns with the odor of incense and imparts a very pleasant aroma over the countryside when it is utilized. There is no wood on the Central Plateau and transportation problems are too acute to bring in coal,

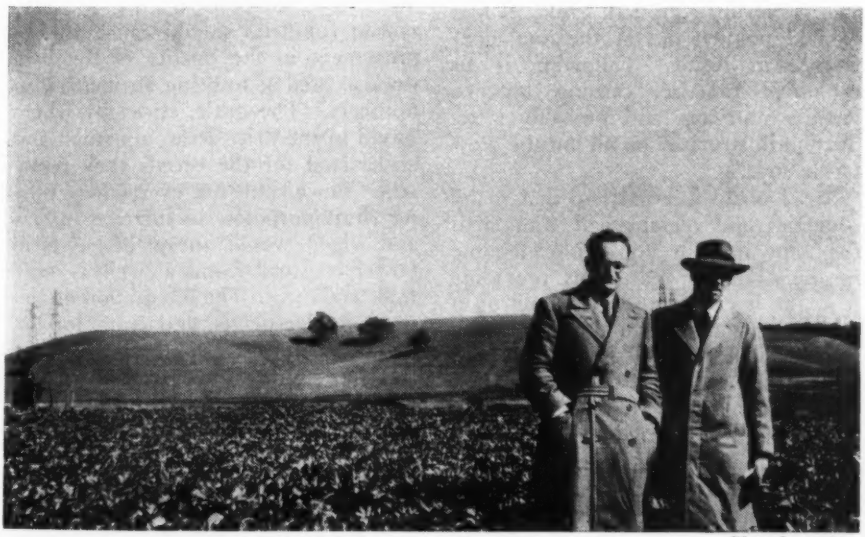

Photo by author.

Fig. 5. Sulla is a promising forage crop in Italy and perhaps will be found to be adapted in other Mediterranean countries. Left to right: Dr. Litt. Scabardi, Italian Ministry of Agriculture, and Mr. Donald of Australia.

hence these villagers are practicing an age-old custom in burning their manure. That this practice creates a special soil-fertility problem in Central Turkey, there can be no doubt. Nor can the farmers there be criticized for burning the manure, since it is the only accessible fuel at their command.

Rotations

Another major point which was strongly emphasized in the report of the Mission was directed specifically toward existing rotations. Many of the rotation practices now in vogue have been handed down from generation to generation without thought of change. Undoubtedly some of these practices are good, but with the pressure on the land as great as it is today, the rotations now need close scrutiny.

Take, for example, the wheat fallow rotation. In this rotation, if one can call it such, wheat is grown one year in two, the land being fallowed in the alternate year. Fallowing such as is done with a wooden plow is of doubtful significance in the conservation of water. That it does have some benefit from causing nutrients to become available is readily admitted. But, as Mr. Donald pointed out at the final conference in Rome, "Fallowing is an exploitive practice, causing loss of fertility nutrients and probably a reduction in structure on all but the most fertile soils."

Mr. Donald asserted also that many countries and regions had eliminated the fallow in favor of growing a legume in the "fallow" year, thus providing feed for livestock as well as nitrogen and organic matter to the soil in the roots and stubble of the legume and in the manure that is produced from it. This change was suggested wherever rainfall would permit.

Then there is the system of wheat monoculture, in which wheat is grown on the same land many years in succession. This program is followed when the rainfall is high enough usually to produce a fairly good crop each year. There is much evidence from experiments in Italy and elsewhere in the area that as much wheat can be produced when the land is in wheat two years in three, with a legume for fodder or pasture the third year, as when wheat is grown each year in the three-year span. More legumes, better livestock, better fertility, and as much or more wheat—thus a beneficent circle is created.

Such a change in the farming program from wheat monoculture to a wheat-wheat-legume rotation entails a basic change in land use, as Dr. Rowland pointed out in the final conference in Rome. At this conference, he stated, "The introduction of pastures and fodder crops into cereal rotations in the Mediterranean is a far more complex task than the mere incorporation of a new cereal." He said, also, that the new cereal-legume rotation must be designed to achieve a steady flow of pasture and fodder for livestock, a continuation or an increase in the over-all production of cereals, particularly for human consumption, and an improvement of soil fertility.

The incorporation of more legumes into these rotations of the Mediterranean countries should cause an improvement in the quality of the livestock as well as to bring an increase in numbers. The cattle, especially where found in the drier areas, are small and undersized for the breeds they represent. Since cattle are everywhere used for draft purposes, an increase in size and vigor would mean better farm power on small farms as well as more milk and meat. The integration of animals, fodder plants, and crops for human consumption should be featured by the prominent use of legumes, which in turn would bring more manure to use on the farm, better soil fertility, and in many areas an expansion of arable land by incorporating some of the so-called permanent pasture land into the farming system.

Unfortunately, in some areas there

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Fig. 1. Nitrogen-treated permanent grass pasture will furnish a week's earlier grazing, two to three times as much feed, a more palatable forage with a higher protein content, and a thicker turf with greater moisture-holding capacity. It will reduce runoff, carry cattle for a longer period into the summer months, and will help to choke weeds. It all adds up to more low-cost, home-grown protein feed, and fits into our national program of soil conservation and a grassland type of farming. Nitrogen backed up with phosphate and potash in a complete fertilizer such as 10-10-10 will maintain high-level production over a period of many years.

Pasture Improvement With 10-10-10 Fertilizer

By C. J. Chapman

Soils Department, University of Wisconsin, Madison, Wisconsin

PASTURE improvement through the use of 10-10-10, or other high nitrogen fertilizer, looms up on the horizon as a great opportunity for low unit cost milk and meat production on Wisconsin farms. There are thousands of acres of pasture land in Wisconsin where the application of 500 lbs. of 10-10-10 per acre every second or third year (with ammonium nitrate or other nitrogen fertilizer applied during the intervening years) will be found a highly profitable investment. Some agronomists say apply 10-10-10 every year. Why worry, they say, about building up a little reserve of phosphate and potash in these old, depleted permanent pastures.

More abundant pastures will give us cheaper feed and in turn will make possible greater production of low-cost milk and other food products. They fit into our program of grassland farming and all-out production in this critical period.

The average farmer devotes 90 per cent of his time and energy to the production of cultivated crops. He prepares and fertilizes his cropland in the spring, sows his seed, cultivates his crops, then harvests and stores these crops in his barns, silos, and granaries.

Fig. 2. Here is one of the 213 acre scale 10–10–10 pasture demonstrations set up on as many farms scattered over 45 Wisconsin counties in 1951. This photo, taken on the Oscar Schaller farm at Wonewoc, shows Fred Field, Juneau County Agent, holding handfuls of grass from fertilized and unfertilized areas. The day this picture was taken Mr. Schaller's cows were spectators, but on another day in early June more than 100 farmers turned out to see this demonstration.

Yields: (Dry weight—total of 3 clippings)

10–10–10 at 500 lbs. per acre	**= 4,162 lbs.**
No fertilizer	**= 1,912 lbs.**
Increase	**2,250 lbs.**

Figuring this extra 2,250 lbs. of protein-rich and palatable forage equivalent in feeding value to a 16% dairy feed (which sold in Wisconsin last spring at about $65 per ton) we arrive at a figure of $73.13. The cost of 500 lbs. of 10–10–10 fertilizer last spring was $18, and there will be a residual benefit from the extra phosphate and potash left in the soil which will benefit both legumes and grasses next spring.

In turn he "chores" all winter in converting this feed into milk and meat. But when spring comes most farmers turn their cows out on what has always been just taken for granted—permanent pasture!

A few farmers have made a start in the renovation of their old grassland pastures. Many farmers are providing some rotational pasture and every year use a certain portion of their legume acreage for pasture. Some farmers are growing an acreage of sudan grass or other emergency crops for mid- and late-summer grazing. But even where pastures are renovated, they eventually "peter out" with June-bromegrass and timothy again taking over.

The lack of nitrogen is the bottleneck that is more responsible for poor pastures than is the lack of any other element. There are thousands of acres of poor, thin, yellow, sparse permanent grassland pastures that are starving for nitrogen. It is true, the native white clover and other legumes do supply some nitrogen to native grasses, but white clover is not too dependable. In fact, it is fickle, a here-this-year and gone-the-next type of legume.

Where straight nitrogen fertilizer is applied year after year, the increased growth of grasses uses up the supplies of readily available phosphate, potash, and lime in our soils, and it soon becomes necessary to apply mineral fertilizers on these pastures. We recommend the liming of acid pasture lands at the outset. A basic treatment of phosphate and potash is also recommended for most pasture lands along with the nitrogen fertilizer. The application of from 300 to 500 pounds per

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Soil Fertility and Pastures

By Firman E. Bear

Soils Department, Rutgers University, New Brunswick, New Jersey

IN the October 1950 issue of Successful Farming there was an excellent story about Ben Moy, a Buffalo County, Wisconsin, farmer who threw away his plow and sowed his hilly, eroded, 240-acre farm down to bromegrass and alfalfa. His present equipment is confined to that required to lime, fertilize, seed, grow, and harvest grass-legume forage. Life on his farm is not as full of trouble as it used to be.

A great many other intelligent dairy farmers on hilly land have come to realize that plowing and cultivating are enemies of the soil. They have found that corn on a dairy farm is parasitic on the grass-legume forage crops that are needed in much greater quantity and in much higher quality for economic milk production.

My first experience in improving grassland was in West Virginia some 35 years ago. In those days, W. D. Zinn, a prominent farmer, institute speaker, and part-time county agent, was advocating the use of limestone and superphosphate as a means of increasing the productivity of permanent bluegrass pastures. Where the topography of the land permitted, disking and reseeding with grasses and clovers were recommended. The effects were often phenomenal.

But the rate at which his suggestions were applied never attained any great momentum. Most of the pastures in West Virginia were being used for the production of beef cattle on which the profit margin was relatively small. Also, it was soon found that more than limestone, superphosphate, and reseeding were required to get and keep a stand of clover.

In Europe, carefully-saved manure and basic slag have long been used to excellent effect on permanent pastures. The manure serves primarily as a source of nitrogen and potassium and the basic slag supplies lime and phosphorus. Both materials are important sources also of the minor elements that are missing over large areas of pasture land.

It was not until the end of the first World War, when the produce of the tremendous nitrogen-fixing factories of Germany and England was diverted from explosives to agriculture, that really intensive systems of pasture management came into being. One such system, which added heavy use of nitrogen fertilizers and rotational grazing to the program, had been started at Hohenheim, Germany, in 1917. This system, fostered by the Stickstoff Syndikat in Berlin and by Imperial Chemical Industries in London, began to receive serious consideration in this country about 25 years ago. The first experimental project of this type in the United States was put into operation at the Dairy Research Farm at Sussex, New Jersey, by Bender (5) in 1927, where it has been in effect ever since.

Program Brought Results

Notwithstanding the known values of lime, complete fertilizers, improved strains of grasses and legumes, and rotational grazing, progress in pasture improvement and management had been distressingly slow. But the "Green Pasture" program, which is being fostered by the Extension Services of the several Northeastern States, has resulted in getting large numbers of

farmers alerted to the possibilities for profit in improved grasslands.

In New Jersey, stress is laid on having uniformly good grazing from early April to late November, a period of more than 200 days. The program includes the use of winter grains for early spring and late fall pasture, rotational grazing of bluegrass-white clover swards, and the growing of orchard grass-ladino clover, sudan grass-soybean, and bromegrass-alfalfa mixtures for in-between grazing and hay purposes. Various other forage plants, such as Reed's canary grass, sweet clover, and birdsfoot trefoil are also used.

In dealing with these pasture-management programs, I have reached certain conclusions. Some of these are supported by exact experimentation of my associates and myself, some are based on studies of scientific developments in related fields of research, some are the result of field surveys, and some have come from conversations with pasture specialists in this country and abroad.

Concerning Bluegrass

Recently there has been considerable discussion of bluegrass as a weed that should be replaced by improved grasses and clovers on dairy farms. But bluegrass is seldom given an opportunity to demonstrate its real value, being usually grazed continuously from early spring to late fall. Furthermore, the native white clover, which grows here and there and comes and goes from one year to the next, is expected to supply all the nitrogen the grass requires.

The falsity of the concept that the clover will supply the necessary nitrogen to the associated bluegrass is readily apparent following an application of a nitrogen fertilizer. If one wants really good bluegrass pastures that start off early in the spring, extend well into the summer, and come on again with luxuriant growth in the fall, he should, in our experience, give them the equivalent of 500 pounds 10-10-10 fertilizer an acre every year. A second application of 50 pounds of nitrogen after the first grazing will aid in extending the grazing further into the summer and bringing it back earlier in the fall. The protein and mineral content of such pastures leaves little to be desired.

If bluegrass-white clover fertilized pastures are grazed as they should be, which means close grazing followed by a resting period and clipping with a mower, clover stands can be maintained at as high levels as they would have been if no nitrogen had been applied. If available, a 5-ton-an-acre application of manure, supplemented by 50 pounds each of phosphoric acid and potash, will accomplish the same purpose and increase the stand of clover. After such manuring at our Dairy Research Farm, the white clover coverage was 25, 44, 41, and 54 per cent for four successive years.

There is abundant evidence that poor bluegrass pastures can be greatly improved by the use of some of the more modern implements that stir up the old sod without turning it upside down. The efficiency of such machinery has been greatly increased. Poor hillside pastures of any type can be very quickly improved by this process when accompanied by liming to pH 6.0 to 6.5, fertilizing with 500 pounds of 10-10-10, and reseeding to grass-legume mixtures. The nitrogen is usually needed to overcome the competition of the soil microorganisms that work on the old sod.

Our orchard grass-ladino clover lowland pastures have produced at the rate of 5,500 pounds dry matter an acre, following the regular use of lime and the annual application of 250 pounds 0-20-20. Better results would have been obtained by doubling the potash, and that is our recommendation.

Yields can be stepped up still higher by the application of larger amounts of fertilizer or by the supplemental use of manure. The potentialities of dry-matter production in grass-alfalfa mixtures at New Brunswick were found

to be nearly 10,000 pounds dry matter an acre annually over a 2-year period following seeding. This was on well-limed soil that received the equivalent of 1,000 pounds 0-12-12 fertilizer and 25 pounds borax an acre annually.

Quality of produce tends to deteriorate with increasingly high yields above a reasonable level. This is due in part to the higher proportion of stems to leaves. Quality also tends to be lowered from one year to the next. This is because of the soil's dwindling capacity to deliver enough of both the major and minor mineral elements to the forage plants to meet the needs of the animals that consume them. As the pH value of the soil begins to drop, beginning with the first year after seeding, the availability of all the minor elements, except molybdenum, tends to increase. The manganese content of alfalfa was higher each year over a 3-year period (2). But the cobalt content fell successively from 0.12 to 0.08 and 0.07 parts per million dry matter, and zinc from 0.58 to 0.33 parts per million by the second year.

The Potassium Problem

Special attention is called to the potassium problem. The soils of most permanent pastures have been badly robbed of this element over the years. When it is finally added, a large part of that applied is often fixed by the soil. This fixed potassium is held much more tightly than that adsorbed in the exchange complex. In other words, to get the effect desired, very heavy applications may be required until the potassium level of the soil has been materially raised.

Orchard grass was found to contain one per cent more potassium than the legumes that are associated with it. Similar findings have been reported (3) with bluegrass and bromegrass. Crabgrass, dandelions, shepherd's purse, and dock have very high potassium-accumulating powers, often containing from two to three times as much of this element as the alfalfa associated with them. One of the most important causes of the disappearance of white clover in bluegrass pastures is the competition for potassium that is provided by the grass and weeds. Similar troubles are experienced in grass-legume hay mixtures.

Time of Application

It is generally assumed that fertilizers can be applied to pastures to equally good effect at any convenient season of the year. It is too bad this is not true, since we need to distribute farm and factory labor over a larger part of the year. And, it is much easier to get over the land in summer and fall than in early spring. But in a 5-year test of nitrate of soda and sulfate of ammonia on permanent pastures at New Brunswick, the yields were 36 per cent greater on the average from March applications than from those in October. In similar comparisons of a phosphate-potash mixture, the yields were 22 per cent higher from the March applications.

At reawakening time among the soil microorganisms each spring, there is need for extra nitrogen and phosphorus, elements that are found in very high percentages in their cells. Some bacteria have been found to contain over 10 per cent nitrogen and 2 per cent phosphorus. Such microorganisms offer serious competition against grass and clover for these and other elements in early spring.

Use of the airplane (4) for distributing fertilizers will aid greatly on the rougher lands. It appears likely that anhydrous ammonia, applied by the use of a combination tillage implement and gas applicator, may enter the picture. Certainly both practices will be given extensive trials on the more rolling pasture lands in the northeastern part of the United States and they may well spread over large grazing areas farther west.

The general tendency to assume that weeds have negative value in pastures is of doubtful validity. It is well known that they add variety to the diet in terms of both mineral and digestible

nutrients. Fertilized weeds of many species make good grazing, and cows mow them down with the grass and clover. The essential point is to keep them growing luxuriantly. The answer to the problem of tall-growing and coarse weeds, as well as clumps of tall grass around dung heaps and urine spots, lies in the regular use of a mower. Interestingly enough, such mowings are often readily consumed by animals, until such time as they become moldy from rain or dew.

One does not care to advocate sowing weed seed. Instead, it appears desirable that more attention be given to introducing a greater number and variety of species of plants into our forage-crop mixtures. Certainly the chances of providing the cow with everything she requires is greatly improved by having variety in the diet. Some plants have much greater capacity to accumulate minor elements from the soil than others. One of the important reasons for having legumes in the mixture lies in their generally high content of cobalt. Bluegrass also is high in cobalt. Timothy and orchard grass are usually very low in this element.

A number of cases of X-disease of cattle have developed on farms that have been very liberally limed and phosphated. These practices reduce the availability of most of the minor elements, notably of zinc. The zinc content of bluegrass and ladino clover from X-disease farms in New Jersey was found to range between 15 and 25 parts per million dry matter, in comparison with 34 to 92 parts per million in the same forage crops on nearby farms where no X-disease occurred. The evidence on this point, however, needs more confirmation.

Something should be said about manure. Our well-fed 1,300-pound Holsteins produce manure at the rate of 21 tons annually per cow, not including the bedding (1). Of this, 75 per cent is feces and 25 per cent urine. This manure contains about 9½ pounds nitrogen, 3 pounds phosphoric acid (P_2O_5), and 8 pounds potash (K_2O) per ton. The annual output of fertilizer constituents in the manure of such a cow is estimated to be equivalent to one ton of 10-3-8 fertilizer. It would seem that such an amount of plant nutrients, no matter whether they were dropped directly on the soil by the cow or were hauled out from the barn, should go a long way toward maintaining the fertility of the land required to produce enough feed for that cow.

In theory, there should be little need for anything but lime and superphosphate to supplement the manure on a dairy farm, assuming that legumes were grown in the hay and pasture mixtures. In proportion as grain feeds are purchased and fed, the picture looks better still. But we have found that fertility levels on the pasture soils of many dairy farms are very low. Evidently much of the value of the manure contributed by cows is lost in drainage water. It would pay dairy farmers to explore means by which such losses can be lowered. Ammonia losses can be kept down by adding superphosphate to the manure as it is applied. If the urine is collected separately from the dung, air-tight containers with oil seals are required to prevent escape of ammonia.

It would not be becoming to a believer in soil conservation to omit mention of the healing properties of grass on eroded soil. The roots of the grasses sew the soil to the earth. In proportion as more grass is grown on more acres of land, the best interests of the Nation are served. That applies today, but it applies much more to tomorrow.

References

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Fig. 1. Spreading poultry manure on pastures is a regular farm job in Bethel Community. Seen here on the tractor hauling a load of manure is Elmer Truelove, with one of his brothers, Oscar.

Bethel Community Hits Its Stride

By T. S. Buie

Soil Conservation Service, Spartanburg, South Carolina

"I JUST tell you, the steering wheel of a tractor naturally fits a man's hands better than plow lines. Then, too, paydays come closer together when you sell milk every day and chickens 3 or 4 times a year. You know, when you grow only cotton, you get only one payday in a whole year."

The speaker was Elmer Truelove, one of the five Truelove boys in the Bethel Community, 15 miles north of Gainesville, Ga., an area which has become famous as a production center for broilers. Elmer and his brother Roy served in the armed forces during the last war. All five brothers are now working on the old home farm or other farms nearby. They were encouraged because of the things Elmer mentioned to stay on the farm instead of seeking jobs in town.

You need only to drive through this community, as I did not long ago, to see the remarkable changes that have taken place within a few years—changes brought about by families like the Trueloves and their neighbors. One of the most striking is that on hillsides which were cleared of trees and planted for generations to cotton and other row crops, grass is appearing. There are sound reasons, too, for this change.

Rudolph Clark, one of the supervisors of the Upper Chattahoochee Soil Con-

Fig. 2. Rudolph Clark, right, puts more fertilizer on his pastures than he used to put on his cotton, and it pays better, he says. Last spring he sold $1,000 worth of seed from this 4½-acre fescue-ladino pasture that he and District Conservationist T. O. Galloway are examining with Mr. Clark's young son, Ted.

servation District, in which the Bethel Community is located, inherited his farm 17 years ago. For some years, he and another man worked the farm together and each averaged about $500 or $600 a year on the crops—mostly cotton and corn.

"You just can't make a living up in this country growing row crops like cotton and corn," said Mr. Clark, standing at the door of his neat, well-equipped homestead. "I have found out," he continued, as he indicated a 4½-acre pasture of Kentucky-31 fescue and ladino clover, "that fertilizer pays better on my pasture than anywhere else.

"There are 4½ acres in that field," he said, "and I grazed 14 calves all winter before last, and then 8 sows, a boar, and 46 pigs until August 20. The army worms got in there then and ate it down to the ground. But you know those plants have deep roots, and the worms only ate the tops. I put on 400 pounds of superphosphate and 400 pounds of 4-8-6 fertilizer to the acre, drilled it in, and harrowed twice. Then in early October I added 100 pounds of nitrate of soda. That is more fertilizer than I used to put on my cotton, but it pays better, as I just said."

As we walked across the pasture, Mr. Clark went on to say, "I forgot to tell you that I sold $1,000 worth of seed from this same field last spring and then the grass and clover got so far ahead of the hogs in the summer that I cut 250 bales of hay." Considering such excellent returns, I can easily see why he has such a high regard for his pasture.

Nearing one of the chicken houses, from which he sells 33,000 chickens each year, Mr. Clark continued the conversation, "Chickens and grass just naturally go together. The manure is fine on the grass and by keeping the ground covered the year around there is not much washing."

He did not tell me just how much his current net income is, but I know it is far more than it was when he first began farming, and before he planted so much of his land to pasture and other feed crops. He doesn't have to divide what he makes on the farm with anyone else, for he and his 12-year-old son operate the farm. They do have a hired man to care for the

Fig. 3. Bethel Community farmers believe in regular application of fertilizer. Harold Rail, Navy veteran, is using the hand method of applying fertilizer on a small patch of Kentucky-31 fescue in front of his house.

chickens and he helps them out occasionally if they get too far behind and in too much of a rush.

"Let's drive around a little; I want you to see this Bethel Community and what we are doing here now," Mr. Clark suggested.

As we drove for several miles, in and out of the community which centers around the Bethel schoolhouse and church, built in 1882, he told me about the 50 farmers who make up this community.

"The average-size farm is about 100 acres, with two-thirds to three-fourths of it open land. Up to 5 or 6 years ago our principal crops were planted in the row each year, cotton and corn mostly," he related. "But our land was too steep for row crops. Now we concentrate on chickens and cattle. What we like is kudzu on the steepest slopes and sericea on those not quite so steep. Kentucky-31 and ladino clover make the ideal combination for grazing, especially when planted on the level areas near streams. Then, too, we grow a lot of annual lespedeza. Most of our farmers are following these practices, and eliminating row crops."

On the crest of a small hill we stopped to look down across a beautiful pasture along a small creek bottom. Just beyond the fescue-ladino clover mixture, which was as pretty as any pasture could be, we saw a portion of the bottom land which was grown up in alders and other brush.

"Just look at that land on the next farm. It isn't paying that man anything. It could be made like this," said Mr. Clark. "He is beyond our community and hasn't come under the influence of our group as yet."

These 50 farmers who constitute the Bethel Community are interested not only in their crop lands and pastures, but in every piece and parcel of land as well. I saw sericea that had been planted along the road after the banks were smoothed and leveled. As we looked across the sloping hills we saw a beautiful picture of land use, occasionally cultivated fields, but with every hillside covered with green crops. All were fitted perfectly to the contours of the hills. On every side there was evidence of new pastures, land being prepared, and fertilizer and lime being distributed.

"We have tried to get everybody to cooperate with our soil conservation district and to take advantage of the P&MA payments," Mr. Clark said. "It has been only 5 years since all this land was very sorry looking. The trouble was farmers were planting cotton on land where no row crops should be expected to grow. The chicken business has built it up. It and conservation farming go together. We sell more from the land now every year than the land itself would have brought a few years ago."

We stopped and talked with a number of his neighbors; one of them was a Navy veteran, Harold Rail. I was particularly impressed by the things he talked about: Coastal Bermuda, Kentucky-31 fescue, the pH value of the soil, sericea, importance of proteins in crops, reseeding crimson clover; these and other expressions were as commonly used by him and his neighbors as lay-by time, pulling fodder, sweet potatoes, and turnip greens were a few years ago.

Mr. Clark swung his 3-year-old son Ted up in his arms and looked across at Wauka Mountain in the distance. Then his eyes rested on the land closer home, on a field which had been in corn last year.

"You know, I planted only 2½ acres of corn last year," he recalled, "but I don't expect to plant any this year. I can buy what little we need easier and cheaper than I can raise it. I don't have any livestock to feed it to for I don't see the idea in keeping mules just to raise corn to feed them on during the winter. I had rather put my efforts in doing something that will pay me better," he added, with a note of conviction in his voice.

Around his house, like all others in the community, is a well-kept yard in which grass is growing, with shrubs properly placed against the house. Grass grows to the doors in most places for these people who have made an ally of grass in their fields, and now are willing to see it grow in their yards. Incidentally, this eliminates the arduous task of yard-sweeping every Saturday.

The people of Bethel Community take a great interest in their community activities, and the schoolhouse

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Fig. 4. Grassland farming has brought comfortable living to farmers in the Bethel Community. Here's Ted Clark getting the mail out of the box in front of the Rudolph Clark home.

Potassium in Animal Nutrition

By J. W. Turrentine

Washington, D. C.

IN our absorption with the scientific use of potassium (potash) as a plant food we have in general overlooked its equally essential role as food for man and beasts.

This absorption with the plant-food role of potash is evidenced in many ways. Our agricultural literature with its innumerable articles relating to crop feeding with potash based on research, experiment, and demonstration by a host of Federal and State scientists is eloquent testimony to that interest extending now over many years and, in fact, dating back to the days of Liebig. And the soundness of their conclusions and advice to the farmer based thereon is strikingly illustrated by the fact that the agriculture of North America currently consumes some 2,500,000 tons of potash salts, equivalent to 1,400,000 tons of K_2O per annum.

Plants of commercial importance have been analyzed to determine their potash content in desirable or optimum concentration and observations recorded when that concentration falls below the minimum requirement. These potash-deficiency symptoms have been widely publicized through verbal description and photography. Thus, the potash content of the major crops has been shown to vary among them, from 30 lbs. K_2O per acre for wheat (30 bu. grain and 1.25 tons straw) to 165 lbs. per acre for sweet clover (5 tons). When soil tests indicate a lack of potash in available form in the soil, the farmer is advised to add more from commercial sources.

But no such researches of such dimension have been conducted to determine the potash requirements of man and animals. In fact, little recognition has been given to potash as an essential food for man and animals. Accordingly, we have no colored pictures illustrating "potash deficiency" in that large biological category and are not likely to have so long as our present basic foods containing potash are so abundantly available. Furthermore, as recent research has shown, the animal system has perfected the device whereby potassium is stored up in the body cells and maintained there in optimum supply, released under certain cell excitations but restored from the blood when those excitations end. The blood supply has its origin in the food we eat, and the excess over what is needed to maintain the cellular content is eliminated along with body wastes.

In the Human System

Thus, in the human system the total potassium supply is stated to be some 175 grams of K. Most of this supply is within the body cells. In the blood plasma surrounding the cells there are .3 grams, while in the whole blood there are 8 grams potassium. Against a "daily starvation loss" of .6 grams, there is a daily intake of 3 grams which can be increased to 20 grams per day without harm. Obviously the daily intake must vary widely depending on dietary habits. Raw vegetables would appear to be a more abundant source, but after they have been boiled, for example, their potash content is greatly reduced.

What we are discussing here is the potassium cation, the form that element invariably takes in dilute aqueous

solution. This is without regard to its origin, whether that origin is the slightly soluble silicates such as feldspar, leucite, or greensand, or the soil colloids by which it is absorbed in replaceable form from the soil solution, or decaying vegetable matter released from "green-manuring crops" and compost, or is the freely soluble potash salts such as potassium chloride and sulfate so extensively used in agriculture. Once it is released in its ionic form, it assumes all of its characteristic properties and it is in this form that it enters the plant roots and thence into the circulating plant sap, thereby reaching the plant cells. Therefore, its origin has no bearing whatever on its biological functions.

Three Ions

While we speak here of the potassium atom and ion in the singular we are aware of the fact there are three potassium ions that so far as we know are always found together in definite ratios, which means that their physical, chemical, and biological properties are practically identical, with the exception of slight variations in atomic weights, they being respectively 39 (K-39), 40 (K-40) and 41 (K-41), and the fact that K-40 is radioactive. Thus potassium has the distinction of being the lightest radioactive element of the periodic system of chemical elements, but little can be made of that distinction since the ratio of K-40 is only .01 per cent while that of K-39 is 93.38 per cent. Nevertheless, this radioactivity has been the inspiration for much experimentation and speculation as possibly offering an explanation of the obviously essential role of potassium in life processes, as a source of energy, perhaps; but the amount of energy so released is so slight as to make it difficult to assign any great importance to it.

This brief discussion of the three potassium isotopes is introduced with some reluctance as further complicating a subject which is already complicated enough in the physiologist's efforts to understand and explain the functions of potassium in the living cell. For the sake of simplification it is more useful to consider the potassium cation in aqueous solution as a single entity and let it go at that.

Twofold Mystery

The mystery that excites the curiosity of the research scientists in the complicated chemical, physical, and biological systems involved are twofold:

1. How does the potassium ion get into the living cell from the blood to the virtual exclusion of the closely related and similar sodium cation and once in, stays in, and
2. Just what is its function within the cell that makes it essential to life. This mystery is deepened by the fact that experimental evidence is lacking to show that the potassium ion enters into chemical combination with any other elements in either plant or animal, although theory implies that it must.

That these problems are increasingly engaging the informed attention of physiologists is strikingly illustrated by the article, "New Developments in Potassium and Cell Physiology: 1940-50" by C. W. Sheppard, of the Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, which appears in the issue of "Science" of July 27, 1951. Therein the author reviews the contributions of the workers in this field for the decade indicated in the title, providing a bibliography of 96 references. While the reader of this article may not find therein the solution to the two aforementioned mysteries, he is made aware of the nature of those mysteries and the vast complication of the sciences and techniques that are being brought to bear in their study.

Among these references recommended for the layman is the highly informative article, "Potassium," by Wallace O. Fenn, Professor of Physi-

ology at the University of Rochester School of Medicine, which appeared in the "Scientific American" issue of August 1949, pp. 16-19, from which excerpts are quoted in the following paragraphs. As a subtitle the following appears: "The 19th element of the periodic table has fascinating physical and biological eccentricities. Its behavior in cells is one of the fundamental characteristics of life." This indicates the nature of the discussion wherein a wealth of fact and theory is presented and the statement made that, "potassium is coming to be recognized by biologists as one of the most interesting and significant among all the 92 natural elements."

Importance to Life

The question immediately arises in the mind of the inquisitive—just why did life at the time of its origin pick out this element and assign it such an important place in its life processes, a constituent of the cell which is the basis of all life? That line of inquiry, of course, leads us back to the beginning of life and to speculation as to the nature of the environment in which life had its origin. The sea is generally accepted as that environment, but the sea of that far distant time probably had little resemblance in composition to that of more recent eras.

The geologists in their turn ascribe to potassium a much more active role in the shaping of the earth than it occupies today. They give prominence to the energy liberated by the radioactivity of potassium now practically exhausted and reduced to insignificant power. They even theorize that this energy was sufficient to maintain the earth in its early molten state, a state substantiated by the igneous rocks with which we are familiar. In this connection they point out the great abundance of potassium in the earth's crust, while at the same time calling attention to the fact that this potassium is to be found in the sedimentaries in percentages comparable to those of the older rocks.

This leads to the logical conclusion that potassium was in relatively higher concentration in the sea in those earlier eras than today and that its reduction in concentration resulted from its elimination through absorption on the soil colloids from which the sedimentaries were formed and even, as some believe, from the living organisms that took the element into their cells and dying and sinking to the bottom of the sea deposited that potassium as a constituent of the sedimentaries.

Thus, according to theory we find life originating in a medium high in concentration in the potassium ion, tieing in its life processes with an element which it made use of through choice or necessity, possibly utilizing its radioactivity as a source of energy when that source amounted to more than it does today, relying thereon instead of the solar radiant energy, life's dependence of the present era.

Another Theory

Then there is the other theory or possibly a phase of the same theory, that there came about the growing concentration in the sea of the sodium ion with many physical properties similar to those of the potassium ion, accompanied by the reduction in the concentration of the latter. It is obvious from present-day demonstration that the body cell does not accept the sodium ion as a substitute for the potassium ion as is abundantly proven by the fact that it has provided itself with a shielding membrane that admits the one from the blood plasma while excluding the other.

A similar phenomenon is to be observed today in the case of certain sea plants. Reference is made particularly to that so-called giant kelp, *Macrocystis pyrifera,* growing in huge tonnages off the coast of southern California, which received so much attention as a source of fertilizer and chemical potash during the World War I period of alarming deficiency in potash supply, and

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Agronomists Recommend Fertilizer Grades

By J. S. Owens

Plant Science Department, University of Connecticut, Storrs, Connecticut

ONLY moderately good fertilizer supplies are in prospect for the 1952 season. The best information at present indicates a 10% or greater reduction in phosphorus-carrying materials, and possibly a little more nitrogen and potash than was used in 1951. However, an increased demand of 5% to 15% also appears certain and that would mean around 20% less phosphorus than farmers wish to use.

To aid in making the best use of the fertilizers available, the New England Agronomists met in Boston on September 28 to revise the recommendations they made last January. The proportions of phosphorus (phosphoric acid) were reduced in grades which are used chiefly on soils that have been heavily fertilized with high phosphorus fertilizers for a period of years. The need for this change has been becoming increasingly evident with continued research. It is therefore believed that the reductions required will not reduce crop yields or quality.

The largest tonnage of mixed fertilizers used in southern New England has a 1-2-2 or similar ratio of plant nutrients. The grades are chiefly the 5-10-10 (5% nitrogen, 10% phosphoric acid, 10% potash, or a 1-2-2 proportion) and the 5-8-7. The new recommendation is to use an 8-8-8 grade (1-1-1 ratio) or a 6-8-8.

This change will be easy to make if the amount of nitrogen required per acre is used as a starting point. For example, a vegetable crop has been receiving 2,000 lbs. of a 5-10-10 per acre or 100 lbs. of nitrogen. By substituting an 8-8-8 only 1,250 lbs. ($100 \div .08 =$ pounds fertilizer) will be needed. This will reduce the phosphoric acid from 200 lbs. (10% of 2,000 lbs.) to 100 lbs. (8% of 1,250 lbs.). While this is a 50% reduction in phosphorus, it is certain to be ample for nearly all conditions. Should the crop be one which requires a larger amount of potash, a 6-9-12 could be used (1,650 lbs. to secure 100 lbs. of nitrogen) and still conserve over 50 lbs. of phosphoric acid per acre as compared with the 5-10-10 grade.

Another feature of the new list is fewer grades and ratios. This will further simplify selection, and facilitate and reduce costs in manufacture.

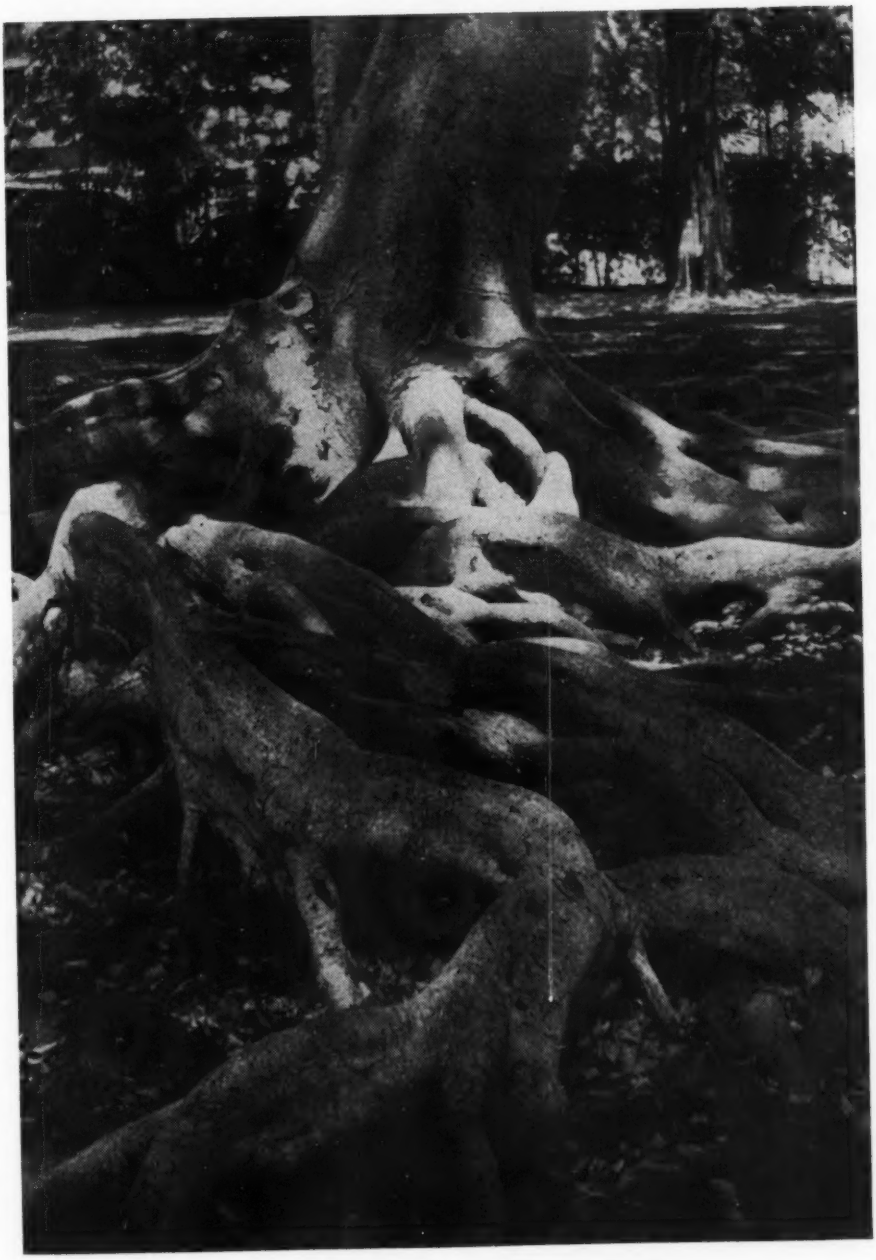
The ratios, minimum grades (the lowest analysis for each grade), and other probable grades of the same or similar ratios recommended are as follows:

Ratios	Minimum Grades	Other Probable Grades
0–1–2	0–10–20	0–12–24 0–15–30
1–1–1	8–8–8	10–10–10
3–4–4	6–8–8	8–10–10
2–3–4	6–9–12	5–8–10
2–1–2	6–3–6 } Tobacco	
1–1–3	5–5–15 }	

The ratios eliminated from the January recommendations are 0-1-1, 1-2-1, 1-2-2, and the 2-3-3. Common grades of these in the same order are 0-14-14,

(*Turn to page* 46)

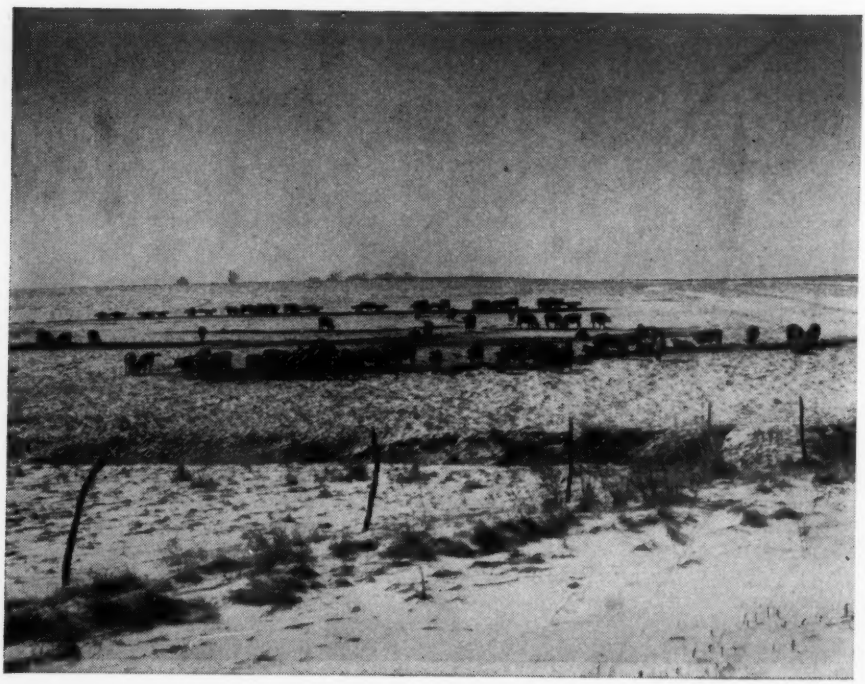
PICTORIAL

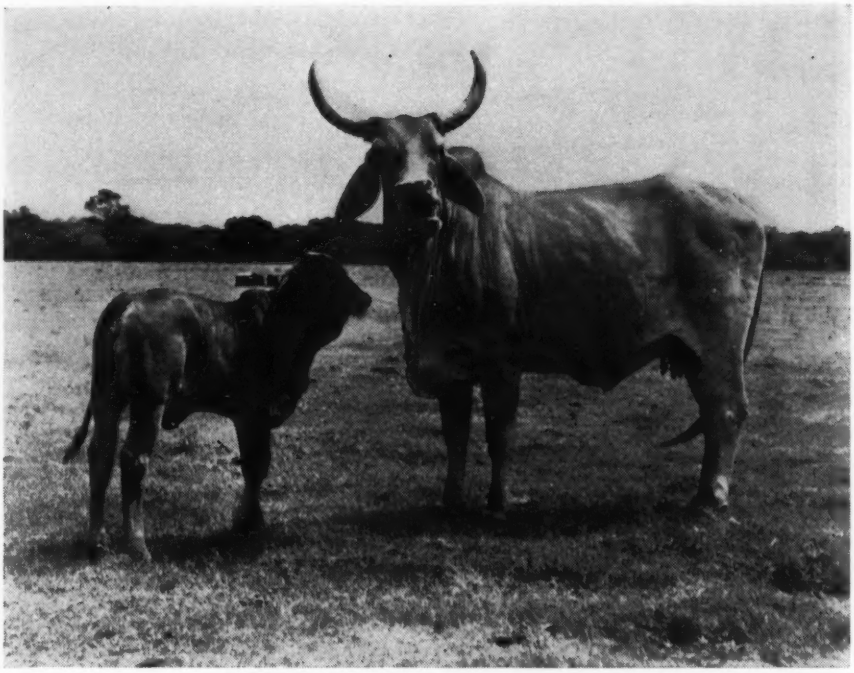


Weeping Fig Tree Roots, Foster Gardens, Honolulu

Above: **Well-housed and well-fed.**

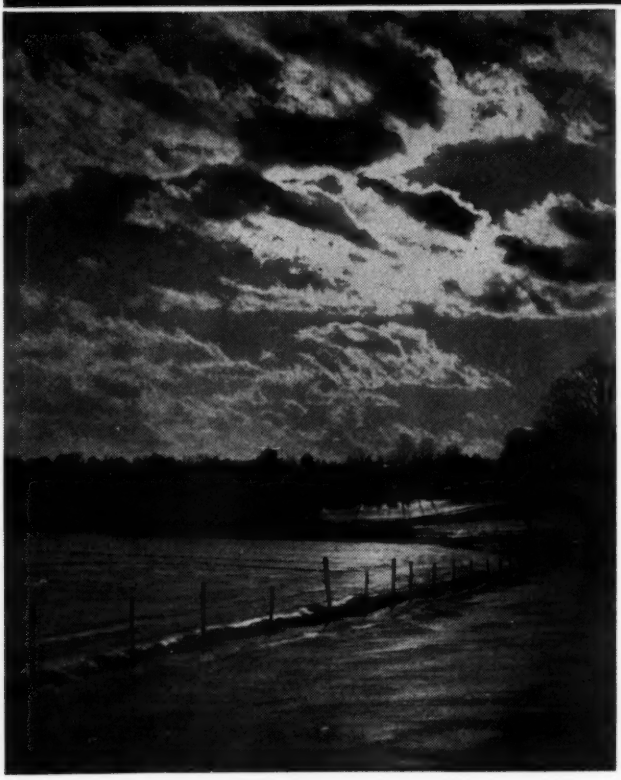
Below: **Herefords on winter range.**





Above: **Pastured in the sunny South.**

Below: **An ice-cold Northern drink.**



Winter Sunsets
South
and
North

The Editors Talk

Grasslands and Bloat

According to J. Kendall McClarren, Bureau of Animal Industry, U. S. Department of Agriculture, in USDA Farm Paper Letter, December 10, bloat, an old livestock problem, is taking on new implications. The drive for a grassland agriculture has brought improved pastures and growing numbers of forage-eating livestock, and with them an increasing incidence of bloat. Serious losses occur in three ways: (1) About 10 per cent of all animals affected with acute bloat die; (2) dairy animals surviving acute bloat drop in production for several days; and (3) many good pastures are not fully utilized because of fear after bloat trouble once occurs.

These and many other points concerning bloat were discussed at a special meeting held in Chicago during the week of the International Livestock Exposition. Scientists from all parts of the country and representing several fields of research took part in the informal discussions arranged by the Agricultural Research Administration of the U. S. Department of Agriculture. A plan for a coordinated research attack was made.

Two broad generalizations can be made as a result of the meeting, reports Henry Marston, Livestock Coordinator for ARA, who served as general chairman.

First, we have no experimental evidence of the real cause of death from acute bloat, nor is much known about the relationship of the many factors that predispose bloat. It is not known whether bloat is a cause or an effect, whether a poison is the cause of death, or whether gas pressures in the rumen may cause mechanical failures in either the cardio-vascular or respiratory systems.

Second, despite the increase in bloat, improved pastures are returning far greater dividends in the form of more meat, milk, and other needed animal products than any losses attributable to this condition. Legumes in improved pastures, which take the major blame for bloat, are also important to the soil conservation program.

Several State experiment stations already are working on the problem and several management suggestions came out at the meeting that would help in preventing acute bloat. One such suggestion was that mixed pastures of grasses and legumes should contain 50 per cent or more grasses. To maintain this kind of grass-legume relationship, however, requires different practices in different sections of the country, under regional recommendations.

Some States also reported less bloat when animals had access to succulent, non-leguminous feed other than alfalfa or clover. There also was general agreement that animals should not be turned out to graze alfalfa or clovers if they have been without feed for some time.

The discussion, and later the plan for research, was divided into five subject-matter panels, each with a discussion leader specializing in that particular field. The panel on physiology was led by Dr. R. W. Dougherty, Cornell University; agronomy, Dr. W. K. Kennedy, Cornell University; microbiology, Dr. W. D.

Pounden, Ohio State University; and management, by Dr. H. H. Cole, University of California.

The importance of this meeting which resulted in a plan for research is seen in the increasing interest and widespread use of legumes, particularly ladino clover, in the large pasture management program under way over most of the country. Ladino clover is one of the big problem plants of bloat trouble. A relatively new plant in pasture use, its popularity has been tremendous because of the many excellent qualities it has from the viewpoint of assuring a large volume of high-quality forage throughout most of the season.

When numerous cases of bloat injury began to be reported, especially from those pastures where ladino clover was predominant, great concern was felt among those working on the grassland program. In many cases, the trouble seemed to be worse where the most intensive methods of pasture improvement were being employed. At one time it looked as though it might undermine the entire program. Remedial measures, such as avoidance of straight ladino stands and management of the cattle on pasture appear to help considerably in overcoming this trouble, but do not seem to be the entire answer.

Our pasture improvement program is so vitally important to the over-all agricultural program that nothing should be spared in bringing to bear all of the resources of agricultural research in its furtherance. It is fortunate that this group is attacking this problem and there is every reason to believe that information obtained from it will eventually show how bloat can be avoided.

The Golden Era

The present era of prosperity being enjoyed by the farmers in this country has been labeled "The Golden Age for American Agriculture" by Cornell University's widely known economists—W. I. Myers, F. A. Pearson, and H. F. DeGraff. According to these authorities, there have been few, if any, eras which even approximate in prosperity that of the last five years. To be sure it has not touched every farm family equally, but looking at the broader panorama, these years have brought opportunity, dignity, and a heightened self-respect to rural America.

This era has been characterized by rising prices, larger production per unit of labor, a phenomenal increase in crop yields, mechanization of farm operations, application of proved practices based on research, expansion of commercialization and specialization, and last but not least, the remarkable improvement in the farmer's physical plant and standard of living.

These economists maintain that never before has there been such a vast application of power to agriculture nor such a rapid advance in knowledge and its almost immediate acceptance. The measure of a man's greatness is his knowledge and the greatness of agriculture is its power.

Many of the recent developments in agriculture may have had their parallels in history, but never before has there been such an auspicious combination of favorable prices, good weather, rising yields, and increasing efficiency of labor occurring at the same time. The farmers of America, with requisite land, capital, and management, have at last grasped that mythical pot of gold at the end of the rainbow.

As the year closes, let us hope that we can add many more five-year periods to a continuation of this Golden Era. In other words, let us make our greetings this year—"BEST WISHES FOR MERRY CHRISTMASES AND HAPPY AND PROSPEROUS NEW YEARS."

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb. Aug.-July	Tobacco Cents per lb.	Potatoes Cents per bu. July-June	Sweet Potatoes Cents per bu. July-June	Corn Cents per bu. Oct.-Sept.	Wheat Cents per bu. July-June	Hay [1] Dollars per ton July-June	Cottonseed Dollars per ton July-June	Truck Crops ....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	78.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	69.8	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	73.4	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.4	61.8	68.2	7.59	21.73	....
1941.....	17.0	26.4	80.8	92.2	75.1	94.4	9.70	47.65	....
1942.....	19.0	36.9	117.0	118.0	91.7	110.0	10.80	45.61	....
1943.....	19.9	40.5	131.0	206.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	42.0	150.0	190.0	109.0	141.0	16.50	52.70	....
1945.....	22.5	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946.....	32.6	38.2	124.0	218.0	156.0	191.0	16.70	72.00	....
1947.....	31.9	38.0	162.0	217.0	216.0	229.0	17.60	85.90	....
1948.....	30.4	48.2	155.0	222.0	129.0	200.0	18.45	67.20	....
1949.....	28.6	46.3	128.0	214.0	119.0	186.0	16.55	43.40	....
1950									
December....	40.36	47.2	88.9	173.0	145.0	203.0	17.05	102.00	....
1951									
January.....	41.31	45.9	98.6	194.0	154.0	209.0	17.85	101.00	....
February....	41.75	32.5	103.0	205.0	160.0	221.0	18.45	100.00	....
March.....	42.73	26.6	107.0	207.0	160.0	212.0	18.35	103.00	....
April.....	43.17	25.3	112.0	203.0	162.0	214.0	18.35	103.00	....
May.....	42.45	39.8	109.0	209.0	164.0	211.0	18.15	101.00	....
June.....	42.02	49.0	108.0	210.0	162.0	208.0	16.85	95.60	....
July.....	39.11	49.5	118.0	219.0	163.0	205.0	15.45	78.00	....
August.....	34.60	47.7	117.0	273.0	165.0	205.0	15.65	69.10	....
September...	33.73	52.4	123.0	287.0	165.0	207.0	16.55	66.10	....
October.....	36.21	57.7	139.0	271.0	164.0	210.0	17.15	69.90	....
November....	41.00	50.0	174.0	280.0	162.0	219.0	18.35	72.70	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	89	81	109	74	87	110
1938.....	69	196	80	79	76	64	57	97	88
1939.....	73	154	100	84	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	105	117	107	82	211	129
1942.....	153	369	168	134	143	124	91	202	163
1943.....	160	405	188	235	174	154	125	231	245
1944.....	167	420	214	216	170	160	139	234	212
1945.....	181	366	205	232	198	170	127	227	207
1946.....	263	382	178	248	212	209	141	319	182
1947.....	257	380	232	248	336	259	148	381	226
1948.....	245	482	222	253	201	226	155	298	214
1949.....	231	463	184	244	210	210	139	192	201
1950									
December....	325	472	128	197	226	230	144	452	211
1951									
January.....	333	459	141	221	240	236	150	448	324
February....	337	325	148	233	249	250	155	443	333
March.....	345	266	154	236	249	240	155	457	265
April.....	348	253	161	231	252	242	155	457	225
May.....	342	398	156	238	255	239	153	448	239
June.....	339	490	155	239	252	235	142	424	189
July.....	315	495	169	249	254	232	130	346	204
August.....	279	477	168	311	257	232	132	306	181
September...	272	524	176	327	257	234	139	293	161
October.....	292	577	188	309	255	238	144	310	171
November....	331	500	250	319	252	248	155	322	249

Wholesale Prices of Ammoniates

	Nitrate of soda bulk per unit N	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per Unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk, per Unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947	2.50	1.60	12.72	10.66	12.63	10.46
1948	2.86	2.03	12.94	10.59	10.84	9.85
1949	3.15	2.29	10.11	13.18	10.73	10.62
1950						
December	3.00	1.88	13.48	10.95	10.93	10.93
1951						
January	3.10	1.88	13.37	11.30	11.29	11.11
February	3.13	1.88	13.58	11.39	11.53	11.30
March	3.13	1.88	13.56	11.41	11.53	11.53
April	3.13	1.88	13.61	11.50	11.17	11.35
May	3.13	1.88	13.84	10.41	10.09	10.25
June	3.13	1.88	13.53	9.98	8.87	8.50
July	3.13	2.03	12.37	10.06	8.68	8.56
August	3.13	2.07	11.94	10.41	8.66	8.66
September	3.13	2.07	11.50	10.78	9.26	9.26
October	3.13	2.07	12.85	11.28	10.56	10.32
November	3.34	2.07	13.93	11.28	10.39	10.25
	Index Numbers (1910-14 = 100)					
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	112	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947	93	56	363	302	374	297
1948	107	71	370	300	322	280
1949	117	80	289	373	318	302
1950						
December	112	66	385	310	324	311
1951						
January	116	66	382	320	335	316
February	117	66	388	323	342	321
March	117	66	388	323	342	328
April	117	66	389	326	331	322
May	117	66	395	295	299	291
June	117	66	387	283	263	241
July	117	71	353	285	258	243
August	117	73	341	295	257	246
September	117	73	329	305	275	263
October	117	73	365	320	313	293
November	125	73	398	320	308	291

Wholesale Prices of Phosphates and Potash * *

	Superphosphate, Baltimore, per unit	Florida land pebble, 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[1]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1925	.600	2.44	6.16	.584	.860	23.72	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947	.746	3.05	6.60	.432	.706	18.93	.195
1948	.764	4.27	6.60	.397	.681	14.14	.195
1949	.770	3.88	6.22	.397	.703	14.14	.195
1950							
December	.798	3.98	5.47	.420	.796	16.00	.210
1951							
January	.810	3.98	5.47	.420	.796	16.00	.210
February	.810	3.98	5.47	.420	.796	16.00	.210
March	.810	3.98	5.47	.420	.796	16.00	.210
April	.810	3.98	5.47	.420	.796	16.00	210
May	.810	3.98	5.47	.420	.796	16.00	.210
June	.810	3.98	5.47	.355	.708	13.44	.176
July	.810	3.98	5.47	.389	.768	14.72	.193
August	.810	3.98	5.47	.389	.768	14.72	.193
September	.810	3.98	5.47	.386	.768	14.72	.193
October	.820	3.98	5.47	.386	.768	14.72	.193
November	.820	3.98	5.47	.386	.768	14.72	.193
Index Numbers (1910-14 = 100)							
1925	110	68	126	82	90	98	74
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	106	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947	139	84	135	70	74	78	83
1948	143	118	135	67	72	58	83
1949	144	108	128	67	74	58	83
1950							
December	149	110	112	75	84	66	85
1951							
January	151	110	112	75	84	66	85
February	151	110	112	75	84	66	85
March	151	110	112	75	84	66	85
April	151	110	112	75	84	66	85
May	151	110	112	75	84	66	85
June	151	110	112	65	74	56	80
July	151	110	112	70	81	61	82
August	151	110	112	70	81	61	82
September	151	110	112	70	81	61	82
October	153	110	112	70	81	61	82
November	153	110	112	70	81	61	82

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1925.....	156	153	151	112	100	131	109	80
1926.....	146	150	146	119	94	135	112	86
1927.....	141	148	139	116	89	150	100	94
1928.....	149	152	141	121	87	177	108	97
1929.....	148	150	139	114	79	146	114	97
1930.....	125	140	126	105	72	131	101	99
1931.....	87	119	107	83	62	83	90	99
1932.....	65	102	95	71	46	48	85	99
1933.....	70	104	96	70	45	71	81	95
1934.....	90	118	109	72	47	90	91	72
1935.....	109	123	117	70	45	97	92	63
1936.....	114	123	118	73	47	107	89	69
1937.....	122	130	126	81	50	129	95	75
1938.....	97	122	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	123	130	127	86	56	130	102	77
1942.....	158	149	144	93	57	161	112	77
1943.....	192	165	151	94	57	160	117	77
1944.....	196	174	152	96	57	174	120	76
1945.....	206	180	154	97	57	175	121	76
1946.....	234	197	177	107	62	240	125	75
1947.....	275	231	222	130	74	362	139	72
1948.....	285	250	241	134	89	314	143	70
1949.....	249	240	226	137	99	319	144	70
1950								
December..	286	257	256	138	88	346	149	78
1951								
January...	300	262	261	140	90	351	151	78
February..	313	267	268	141	91	358	151	78
March....	311	272	269	142	91	357	151	78
April.....	309	273	268	141	91	353	151	78
May.....	305	272	266	139	91	334	151	78
June.....	301	272	265	134	91	311	151	69
July.....	294	271	261	135	93	297	151	74
August....	292	271	258	135	94	294	151	74
September.	291	271	258	135	94	300	151	73
October...	296	272	259	140	94	335	153	73
November.	301	274	259	143	98	343	153	73

* U. S. D. A. figures, revised January 1950. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning July 1949, baled hay prices reduced by $4.75 a ton to be comparable to loose hay prices previously quoted.

[2] All potash salts now quoted F.O.B. mines only: manure salts since June 1941, other carriers since June 1947.

**** The weighted average of prices actually paid for potash is lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. The maximum discount is now 16%. Applied to muriate of potash, a price slightly above $.353 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Inspection of Commercial Fertilizers," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Cir. 370, June 1951.

"Fertilizer Recommendations for Kansas," Agr. Exp. Sta., Kans. State College, Manhattan, Kans., Cir. 264, Sept. 1950, H. E. Myers and F. W. Smith.

"Effects of Certain Cropping and Management Practices on Soil Nitrogen Content," Bul. 561, Mar. 1951, P. E. Karraker; "Nitrogen and Phosphorus Relationships in Strawberries," Bul. 562, June 1951, C. S. Waltman; Agr. Exp. Sta., Univ. of Ky., Lexington, Ky.

"Rate, Placement and Source of Nitrogen for Potatoes in Maine," Agr. Exp. Sta., Univ. of Me., Orono, Me., Bul. 490, Apr. 1951, G. L. Terman, A. Hawkins, C. E. Cunningham, and R. A. Struchtemeyer.

"A Preliminary Report on Spraying Nitrogen Fertilizer on Cotton," Agr. Exp. Sta., N. Mex., A & M College, State College, N. Mex., Press Bul. 1048, Dec. 1950, G. Staten.

"Fertilizer Sales in Ohio, January 1 to June 30, 1951," Dept. of Agronomy, Ohio State Univ., Columbus, Ohio.

"Fertilizer Report for the Year 1950," Dept. of Agr., Harrisburg, Pa., Gen. Bul. 635, Vol. 34, No. 2, Mar.-Apr. 1951.

"Fertilizer Requirements for Rice Following Improved and Unimproved Pastures," P. R. 1335, Mar. 5, 1951, R. H. Wyche, R. L. Cheaney, R. M. Weihing, and J. B. Moncrief; "Barnyard Manure and Cotton Burs as a Dryland Fertilizer for Cotton," P. R. 1379, June 13, 1951, D. L. Jones; Agr. Exp. Sta., Texas A & M College, College Station, Texas.

"Six Long Strides to Better Sandy Soils 3. Apply Potash and Phosphate," Ext. Serv., Univ. of Wis., Madison, Wis., Spec. Cir., Feb. 1951, A. R. Albert.

"Fertilizer Use and Crop Yields in the United States," Natl. Soil and Fert. Res. Comm., USDA, Wash., D. C., Rpt. No. 5, Oct. 1951.

Soils

"Soil Fertility Investigations at Columbus Experiment Field, 1924-49," Agr. Exp. Sta., Kans. State College, Manhattan, Kans., Bul. 343, Sept. 1950, F. E. Davidson and F. W. Smith.

"Safeguarding Our Soil and Water Resources 1937-1951," Soil Conser. Comm., Univ. of Md., College Park, Md.

"Build Your Own Terraces," Ext. Serv., Univ. of Minn., St. Paul, Minn., Ext. Fldr. 159, June 1951, H. E. Jones and D. M. Ryan.

"The Land Use Pattern Scale Method of Land and Farm Classification," Agr. Exp. Sta., Miss. State College, State College, Miss., Tech. Bul. 32, July 1951, O. T. Osgood.

"Soils Investigations on the Tucumcari, New Mexico, Irrigation Project," Agr. Exp. Sta., N. Mex. A & M College, State College, N. Mex., Press Bul. 1054, June 1951, M. Fireman, C. W. Chang, and L. W. Healton.

"Progress Report, 1951 Soil and Water Conservation Research at the Red Plains Conservation Experiment Station, Guthrie, Oklahoma," Mimeo. Cir. M-219, Apr. 1951; "Progress Report, 1951 Soil and Water Conservation Research at the Wheatland Conservation Experiment Station, Cherokee, Oklahoma," Mimeo. Cir. M-223, May 1951, Agr. Exp. Sta., Okla. A & M College, Stillwater, Okla., H. A. Daniel, H. M. Elwell, and M. B. Cox.

"Soil Management in Pennsylvania Orchards," Ext. Serv., Pa. State College, State College, Pa., Cir. 381, May 1951, C. S. Bittner.

"Six Long Strides to Better Sandy Soils: 4. Reduce Wind Erosion Damage," Spec. Cir., Feb. 1951; "5. Increase Soil Organic Matter," Spec. Cir., Mar. 1951; "6. Don't Overwork the Land," Spec. Cir., Mar. 1951; Ext. Serv., Univ. of Wis., Madison, Wis., A. R. Albert.

"Soil Survey Manual," Agr. Res. Admin., USDA, Wash., D. C., USDA Handbook No. 18, Aug. 1951.

"Soil Survey: Stockton Area California," Agr. Res. Admin., USDA, Wash., D. C. Series 1939, No. 10, May 1951.

"Release of Native and Fixed Nonexchangeable Potassium of Soils Containing Hydrous Mica," Agr. Res. Admin., USDA, Wash., D. C., Res. Rpt. No. 224, June 26, 1951, R. F. Reitemeier, I. C. Brown, and R. S. Holmes.

Crops

"Cotton Production Practices in the Limestone Valley Areas of Alabama," Agr. Exp. Sta., Ala. Poly. Inst., Auburn, Ala., Cir. No. 100, June 1951, R. W. Robinson.

"Golden Rain Oats for Alaska," Cir. 15, Apr. 1951; Edda Barley for Alaska," Cir. 16, Apr. 1951; Agr. Exp. Sta., Palmer, Alaska, S. C. Litzenberger and B. M. Bensin.

"1950 Arkansas Cotton Variety Tests," Mimeo. Series No. 5, Mar. 1951; "Preliminary Report on Alfalfa Research in Eastern Arkansas," Mimeo. Series No. 6, Apr. 1951, W. C. White; Agr. Exp. Sta., Univ. of Ark., Fayetteville, Ark.

"Farm Life in Ontario," Dept. of Agr., Parliament Bldgs., Toronto, Ont., Can.

"Garden with a Purpose," Ext. Serv., Univ. of Ga., Athens, Ga., Cir. 364, Apr. 1951, E. Ragsdale.

"1950 Varietal Trials of Cut Flowers," Agr. Exp. Sta., Univ. of Hawaii, Honolulu, T. H., Progress Notes No. 63, Feb. 1951, H. Kamemoto, H. Nakasone.

"Sunflowers as a Seed and Oil Crop for Illinois," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Cir. 681, May 1951, R. O. Weibel.

"Tomatoes in Maine," Agr. Exp. Sta., Univ. of Me., Orono, Me., Bul. 489, Mar. 1951, E. F. Murphy and M. R. Covell.

"63rd Annual Report Agricultural Progress through Research," Agr. Exp. Sta., Univ. of Md., College Park, Md., Sta. Bul. A-62, July 1, 1949-June 30, 1950.

"1950 Extension Work in Maryland," Ext. Serv., Univ. of Md., College Park, Md., 36th A. R.

"Growing Sweet Corn for Canning," Ext. Bul. 139, Mar. 1951, F. C. Stark and I. C. Haut; "Vegetable Gardens," Ext. Bul. 141, Apr. 1951, E. K. Bender and R. F. Stevens; Ext. Serv., Univ. of Md., College Park, Md.

"How to Cultivate Tomatoes," Ext. Serv., Univ. of Md., College Park, Md., Fact Sheet 29, May 1951, E. K. Bender and F. C. Stark.

"Crop Varieties for Michigan," Ext. Serv., Mich. State College, East Lansing, Mich., Ext. Fldr. F-157, Apr. 1951.

"House Plants and Their Care," Ext. Serv., Univ. of Neb., Lincoln, Neb., E. C. 5-131 (Rev.) C. C. Wiggans.

"Progressive Development and Seasonal Variations of the Corn Crop," Agr. Exp. Sta., Univ. of Neb., Lincoln, Neb., Res. Bul. 166, Dec. 1950, T. A. Kiesselbach.

"Research on the College Ranch," Agr. Exp. Sta., N. Mex. A & M College, State College, N. Mex., Bul. 359, Feb. 1951, J. H. Knox, W. E. Watkins, M. Koger, and K. A. Valentine.

"1517C, A High Yielding Strain of 1517 Cotton," Press Bul. 1049, Jan. 1951, G. N. Stroman; "Corn Varieties and Hybrids in Southern New Mexico," Press Bul. 1053, Apr. 1951, J. R. Spencer; "Tomato Varieties for the Middle Rio Grande Area," Press Bul. 1056, July 1951, H. Jones; Agr. Exp. Sta., N. Mex. A & M College, State College, N. Mex.

"Summer Care of the Garden," Ext. Serv., Cornell Univ., Ithaca, N. Y., Bul. 832, June 1951, C. B. Raymond.

"Early Vegetable Plants," Ext. Serv., N. C. State College, Raleigh, N. C., (Revised) Ext. Cir. No. 231, Apr. 1951, G. O. Randall.

"The Salt of the Earth, Oklahoma 1950 Annual Report," Ext. Serv., Okla. A & M College, Stillwater, Okla.

"Castor Bean Production," Ext. Serv., Okla. A & M College, Stillwater, Okla., Cir. 552, W. Chaffin.

"Hybrid Corn Strains Recommended for 1951 Based on Results of the Oklahoma Corn Performance Tests 1946-1950," Mimeo. Cir. M-210, Jan. 1951, J. S. Brooks and H. Pass; "Progress Report for 1951, Oklahoma Vegetable Research Station at Bixby, Oklahoma," Mimeo. Cir. M-225, June 28, 1951; Agr. Exp. Sta., Okla. A & M College, Stillwater, Okla.

"Science for the Farmer, The Sixty-fourth Annual Report," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 540, July 1951.

"Science for the Farmer, Supplement No. 3 to Bulletin 529, The 63rd Annual Report," Agr. Exp. Sta., Pa. State College, State College, Pa., June 1951, H. L. Carnahan and H. L. Fortmann.

"Growing Tree Fruits for Home Use," Ext. Serv., Pa. State College, State College, Pa., Cir. 380, May 1951, J. U. Ruef.

"Performance of Varieties of Grass and Legume Species in Pennsylvania—1950," Agr. Exp. Sta., Pa. State College, State College, Pa., P. R. No. 53, May 1951, H. R. Fortmann and H. L. Carnahan.

"Small Grain Variety Tests in the Rolling Plains Area of Texas," Agr. Exp. Sta., Tex. A & M College, College Station, Tex., P. R. 1373, May 23, 1951, I. M. Atkins.

"Tomato Production Guide," Ext. Serv., Univ. of Fla., Gainesville, Fla., Cir. 98, Dec. 1950.

"Cabbage Culture in Wisconsin," Ext. Serv., Univ. of Wis., Madison, Wis., Sten. Cir. 184, Nov. 1936 (Revised Mar. 1951), J. G. Moore.

"Cultural Studies on Carrot Stecklings in Relation to Seed Production," Cir. No. 877, Aug. 1951, L. R. Hawthorn; "Alfalfa for the Yuma Mesa," Cir. No. 879, Aug. 1951, C. D. Converse; "The Cardinal, Calmeria, and Blackrose Grapes for Vinifera Regions," Cir. No. 882, Aug. 1951, E. Snyder and F. N. Harmon; USDA, Wash., D. C.

"Grass Seed Production on Irrigated Land," Soil Conservation Serv., USDA, Wash., D. C., Leaf. No. 300, May 1951, H. F. Oman and R. H. Stark.

Economics

"Comparison of Farming Systems for Large Rice Farms in Arkansas," Agr. Exp. Sta., Univ. of Ark, Fayetteville, Ark., Bul. 509, June 1951,

T. Mullins and M. W. Slusher.

"1950 Agricultural Statistics for Arkansas," Bur. of Agr. Econ., USDA, Little Rock, Ark., Rpt. Series No. 26, June 1951.

"Farming in California," Ext. Serv., Univ. of Calif., Berkeley, Calif., Cir. 173, May 1951, A. Shultis.

"Cigar Leaf Summer Statistics, 1951," Inf-28, Sept. 15, 1951, A. W. Dewey; "1950 Market Review Connecticut Valley Broadleaf and Hanana Seed Binder Tobacco," Inf-29, Oct. 1951, A. W. Dewey and A. J. Coutu; Agr. Exp. Sta., Univ. of Conn., Storrs, Conn.

"Should I Buy a Citrus Grove?" AE Series No. 51-2, Jan. 1951; "Eighteen Years of Citrus Costs and Returns in Orange County Florida 1931-49, AE Series No. 51-6, Feb. 1951; Ext. Serv., Univ. of Fla., Gainesville, Fla., Z. Savage.

"Summary of Annual Farm Business Reports of 2,824 Illinois Farms for the Year 1950," Ext. Serv., Univ. of Ill., Urbana, Ill., Nos. 195 and 196, Aug.-Sept. 1951, A. G. Mueller, F. J. Reiss, and J. B. Cunningham.

"Returns From and Capital Required for Soil Conservation Farming Systems," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Res. Bul. 381, May 1951, E. O. Heady and C. W. Allen.

"Cattle Gains from Tame Pasture in Irrigated Districts of Southern New Mexico," Press Bul. 1047, Jan. 1951, H. B. Pingrey; "Farm Income Possibilities in the Mesilla Valley, New Mexico," Press Bul. 1055, July 1951, W. P. Stephens; Agr. Exp. Sta., N. Mex. A & M College, State College, N. Mex.

"An Analysis of Farm Price Behavior," Agr. Exp. Sta., Pa. State College, State College, Pa., P. R. No. 50, May 1951, W. W. Cochrane.

"Field Crop Statistics for Texas," Agr. Exp. Sta., Texas A & M College, College Station, Texas, Cir. 130, June 1951, C. A. Bonnen and L. P. Gabbard.

"Keeping up on the Farm Outlook," Ext. Serv., State College of Wash., Pullman, Wash., Ext. Cir. No. 198, Sept. 28, 1951, K. Hobson.

"Guide to Agriculture, U. S. A.," USDA, Wash., D. C., Agr. Info. Bul. No. 30, A. F. Raper and M. J. Raper.

"Citrus Fruits, Acreage, Production, Farm Disposition, Value and Utilization of Sales Crop Seasons 1948-49 to 1950-51," Bur. of Agr. Econ., USDA, Wash., D. C., Oct. 1951.

"Brazil: Agricultural Production and Trade Statistics," Foreign Agr. Relations, USDA, Wash., D. C., Stat. Bul. No. 97, Apr. 1951, D. R. Bishop.

Potassium in Animal Nutrition . . .

(*From page* 25)

becoming the second most important source of that essential commodity during that emergency.

Here is a vine-shaped plant, 30 or more feet in length, attached to rocks on the ocean's floor but suspended upward with air-filled floats at the base of each leaf. It is completely submerged in the ocean brine which contains 1.07 per cent of the sodium ion but only .039 per cent of the potassium ion, a ratio of 27:1. Yet from that dilute concentration in the potassium and high concentration in the sodium ion, the kelp plant takes up some 14 per cent dry weight of the potassium, but only some 4 per cent of the sodium ion. From analogy with what we now know of the accumulation of potassium in the animal cell we can assume also that the high potassium content of the kelp plant results from the occlusion of the potassium within the plant cell while the sodium remains within the plant sap.

Here is a relatively simple organism that would appear to warrant the closer scrutiny of the physiologists. The entire plant is submerged in one unchanging environment, ocean brine, of constant concentration and fairly constant temperature. It is uncomplicated by root systems as a source of nutrients, evaporation, and, quite possibly, translocation that characterize land plants, all of these functions apparently being performed by the leaves and stems.

What induced the animals to crawl out of the environment of their supposed origin, ocean brine, is a matter of speculation, of course. It has been suggested that the increasing sodium concentration made that an uncomfortable medium in which to live. That theory, however, is not entirely supported by the fact that when they emerged to take up their abode on dryland, they provided themselves with an envelope wherein they continued to remain immersed in brine of approxi-

mately the same saline concentration as ocean brine. What is meant, of course, is our blood. As expressed by Dr. Fenn, "If the blood had no potassium at all, the heart would be just as much incapacitated as with too much potassium. For its normal beat the heart requires in the blood plasma about 100 parts of sodium to four parts of potassium and two parts of calcium. These are approximately the relative concentrations of the three substances in the ocean. In spite of the great changes in living forms wrought by evolution, the basic living cells apparently still feel the need of a salty environment like that in which life presumably began."

Abnormal Release

In discussing the pathological phases of the potassium concentration of the blood and the importance of a proper ratio of potassium and sodium therein, Dr. Fenn cites conditions inducing the abnormal release of potassium from the cell, thus increasing the blood concentration to an unfavorable level, or on the other hand decreasing it to too low a level resulting from its elimination from the blood through excretory processes. He states, "Physicians now realize the dangers of too low a level of potassium in the blood. There is a hereditary syndrome called familial periodic paralysis in which the muscles become paralyzed, although fortunately it does not affect the muscle of the heart, at least for a time. The disorder can be treated by giving potassium by mouth. A potassium deficiency also sometimes occurs in patients who are given fluids intravenously in large amounts. If these contain no potassium and if the patient is not able to take a regular diet containing a supply of potassium, there may be so large a loss of potassium through the kidneys that the deficiency is felt; muscles become weak and death may result. Persistent diarrhea in infants likewise may deplete the body potassium, for all the intestinal secretions contain considerable amounts of potassium—three or more times as much as the blood plasma. Ordinarily this potassium is reabsorbed into the body, but when the intestines are not functioning properly it is lost. A dose of potassium at a critical time may often relieve a paralysis and save a life."

He adds, "A method for quickly analyzing the potassium in body fluids has recently been developed and is rapidly making its appearance in hospitals. The instrument, called the flame photometer, makes it possible to find out quickly whether a potassium deficiency is threatening." And, "By the use of such an instrument, John S. Lockwood and his staff in the general surgical service at the Columbia University Medical Center believe that they have been able in the last 18 months to save the lives of 10 patients who would otherwise have died."

From the foregoing it would appear that the physiological chemists studying the role of potassium in biological processes are using some of the same techniques, whether working with man or plants, and that both are deriving conclusions not only as to the essentiality of potassium to life but also as to its optimum levels of concentration. Thus we find the plant technologist testing the plant juices for their potassium content, "tissue tests," and the hospital technologists doing the same with human "juices." And the flame photometer is a familiar piece of apparatus to the plant chemist.

But it is the latter who is more generally concerned with the problem of the adequacy of the potash supply. The plant has to depend on the soil solution for its supply and only that portion of the soil solution in which the root system is immersed. If this source is not adequate, the plant cannot efficiently perform the functions for which it is grown, whatever they may be, the potassium entering into all of the metabolic processes of the plant in its essential roles.

Once this is accomplished with adequate fertilization in optimum ratios with other plant foods it would appear

that man and beast consuming these crops as a diversified diet would be assured of an adequate supply of potassium for his biological processes, in the absence of pathological conditions. As we have seen, he has been provided by nature with a most efficient combination of mechanisms to guard against a deficiency of supply. For both groups of physiological chemists in their research in the field of metabolic processes, in both animal and plant, there remains the solution of the mystery of the vital role of the potassium ion within the cell. When that mystery is solved we shall be much closer to our understanding of the very basis of life—metabolism.

Grassland Farming . . .

(*From page* 12)

is a land-use regulation forbidding the plowing of permanent pastures and putting the land to cultivated crops. Such a regulation stems from centuries of livestock husbandry and the use of the land by shepherds, some of whom may belong to the nomadic tribes. With increasing populations and with the deterioration of the permanent pastures to a much lower carrying capacity, such a regulation is definitely outmoded and should be abandoned.

A step forward and away from such a regulation was noted in Greece where seeded pastures were being demonstrated by Mr. Landerman of the Staff of the American Mission to Greece. This consisted of reseeding worn-out pastures to species that should give a higher yield and at the same time required the cooperative effort of many land-owners of the village in a system of "block" cultivation. This effort was being applied also to one very large area of alfalfa, the land for which was owned by many farmers, and to erosion control by means of contour farming and terracing on multiple-owned land.

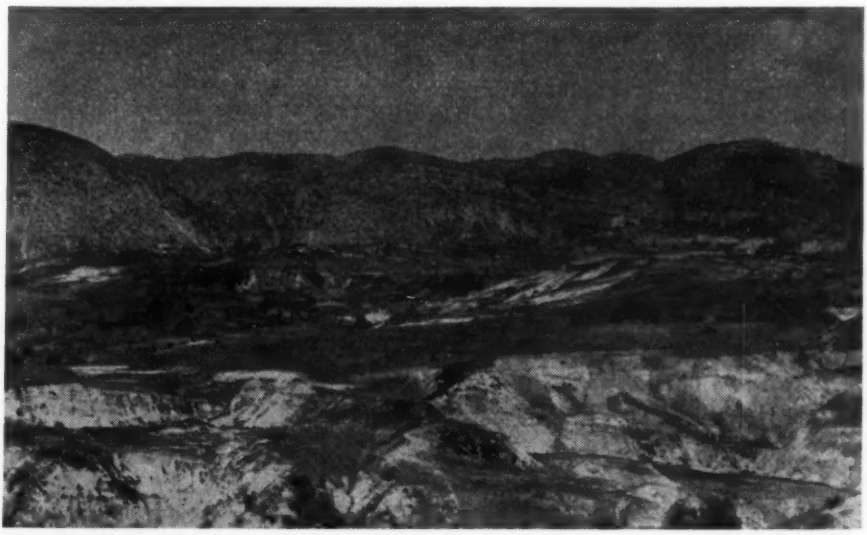


Photo by author.

Fig. 6. Because of overgrazing and deforestation, the Mediterranean countries are plagued by erosion. Photo taken near Serros, in northern Greece, shows an extreme example of soil deterioration by erosion.

The mountain areas of these countries came in for special treatment. When it is known that a country like Greece is 80 per cent mountain and hill land, and that there are many, many villages in these mountains that depend upon the soil for their livelihood, it is easy to realize that here, indeed, is a problem of special importance. Nor is the problem confined to Greece, for all these countries have their hill and mountain populations and problems.

Overgrazing, particularly by goats, deforestation because of the acute need for fuel and timber, and indiscriminate cutting of timber by hostile peoples during wartime—these are some of the causes of the present conditions of the mountain areas. Dr. Whyte called attention to this at the Rome conference, calling it mountain sickness. He described the erosion there, and the bare, rocky slopes, and called attention to the rapid runoff immediately following winter rains which not only caused soil depletion on the slopes but filled up valleys and even the irrigation channels of the level lands below with sand, gravel, and rubble.

Grazing Districts

Dr. Whyte advocated the establishment of grazing districts, such as the one being formed on Mount Olympus in Greece, in which definite areas would be set aside for grazing under reasonable control. Other areas unsuited to grazing would be reforested under this plan. He advocated the setting up of a Department of Mountain Resources to handle land-use problems in mountain areas, such a department to be staffed not only by foresters, but by animal husbandrymen and other interested lines of endeavor.

All the Mediterranean area is rich in species of native flora, it having been the home of many of our better forage legumes and grasses. It appeared to me to abound particularly in legumes some of which none of us had ever seen. Medicagos and vetches were particularly abundant. Dr. Aamodt called attention to this in one of his talks at the final conference and pointed out that one of the major recommendations of the Mission had suggested the collection and testing of these native species. This is not to say that no work along this line had been or is being done, but that a complete assessment of the value of these indigenous forms had not been made in any of the countries.

The value of a survey of this kind by men from outside the area, and going from country to country, can best be illustrated by the example of Sulla, a very large acreage of which was found growing in Italy. Sulla *(Hedysarium Coronarium)* was not found growing on a commercial scale anywhere except in Italy. Yet, it appeared to have a peculiar adaptation to the Mediterranean climate and will, in future, undoubtedly be used in the other countries. Sulla is a legume, sweet enough apparently to be ensiled without a preservative. It makes wonderful pasture or excellent hay and seems to prosper particularly on heavy, alkaline soils such as are found in the Mediterranean area.

Because none of the other countries were using this crop, it appeared particularly pertinent to the Mission that a Mediterranean Grassland Committee be set up for the exchange of ideas. To further this idea, too, it was recommended that a Grassland Journal be instituted, dealing particularly with the fodder and pasture problems of the area.

These are some of the major points covered in the recommendations of the Mission. In all, 28 recommendations which applied generally to all the countries were made. In addition, each country was written up separately and in that discussion certain recommendations which applied specifically to that particular country were made.

Many of the recommendations had a long-range aspect, while others were such that they could be taken up by the agricultural officials, such as the

Extension Services and used immediately in an educational program.

To me (and I am certain other members of the Mission would agree) it was a wonderful experience. All the officials of Ministries of Agriculture, of Educational Institutions, and of Extension Services placed the information we required before us if it was available and were most cooperative. The same can be said also of farmers of high or low estate. Nowhere were we met by any one who was not willing to answer the questions which we proposed to them to help us reach a reasonable conclusion as to how the grasslands of the area could be improved. The wonderful hospitality to which we were everywhere treated will always be remembered.

The establishment of better pastures and the production of more livestock fodder will not solve all the problems of the Mediterranean countries. They are things which are needed, however, and strike at the root of one of the difficulties these countries now face. With the increase in populations, such as is now occurring in Italy, particularly southern Italy, and Greece, many other improvement measures will be required. The land cannot continue to absorb the burden of these heavy populations. Industries of a varied character will be required along with the improvement in agriculture. Some of the most needed industries should manufacture moldboard plows and particularly small tools to replace the heavy mattocks that are now used by both women and men in the fields. Food-processing plants to assure the people an adequate year-round diet should be established also. There are, no doubt, many other needed industries that would give profitable employment to the workers, but these are the ones most apparent to me as a result of my service on the Mission.

The recent history of most of these countries is too well known to recount here. It may be sufficient to say that they are making good strides toward recovery and that what is needed now to go forward to better living, is a cessation from war and strife.

Bethel Community . . .

(*From page* 22)

and church grounds are well kept. The boys can gather around the fish ponds which Mr. Clark and his neighbors have built in almost every hollow. Home life is pleasant and up-to-date, for most of his neighbors, like Mr. Clark, have television sets, and all of the other things which go to make living pleasant and home life comfortable. On the neat and well-kept lawns are chairs, now that the people have time to use them. They don't have to spend all of their time working in the field as they used to.

Much has been written and more said in recent years about the changing agriculture of the Southeast, and as we drove away from this splendid community I realized that here I had seen taking place a tremendous revolution in land use. For the first time since the old hickory and other hardwood trees were cleared from these steep hillsides, a permanent system of agriculture is being developed.

This permanent agriculture embraces a system of land use which will provide a place where soldiers returning from the wars and others who attain maturity can build for themselves lasting homes in an area where just a few years ago deep gullies were commonplace and considered as inevitable.

In an entire afternoon's drive covering at least 25 or 30 miles, I saw only one evidence of active erosion, and that was in a newly planted sericea field where a heavy rain came before the new crop was established. This typifies the change which has come about with such rapidity in Georgia and other Southern states.

New Uses for Sweet Potatoes

By C. B. Sherman

Washington, D. C.

HOW to raise large crops and good crops of sweet potatoes is now pretty well understood. The problem of storage, keeping, and transportation, which plagued farmers, shippers, and merchants for many years has seemed fairly well solved. But research still goes on to prevent waste. Recent experiments showed that much of the difference in keeping quality can be attributed to different implements and procedures used at harvest time. Seemingly superficial injury then may mean considerable deterioration later. An ordinary turning plow and gentle handling, and placing into storage crates as soon as practicable, make a combination that means small damage, then or later.

With these storage and quality problems somewhere near licked, sweet potatoes are now on markets far from their southern fields during virtually all of the year. Yet expanded outlets are needed. In fact for nearly 30 years there has been a steady decline in the consumption per person in spite of the wider and longer distribution. The increase in population has been taking up most of the difference and there has been some dehydration and canning of the crop.

With a view to widening the outlets, the Agricultural Experiment Station of the Alabama Polytechnic Institute has been experimenting with at least three new products, all named most appropriately. Federal-State funds under the Research and Marketing Act have been used for some of the work and the Federal Bureau of Agricultural Economics has aided in the later stages when consumer acceptance tests became the obvious next step.

These consumer tests were scientifically planned and carried through. The analyzed details as to how they were made, who took part, and the replies are covered in comprehensive reports put out by Alabama. Only the conclusions are outlined here as they relate to the three products chosen to be tested.

Alayam breakfast food, ready-to-eat, is made from sweet potatoes and wheat bran. It has a toasted, golden color and keeps very crisp as long as it is in its cellophane container. The sample of consumers in the test represented a fairly large segment of the nation's consumers. More than a third of those who tried the product said they would buy it if it were placed on the market. Nearly a fourth said they liked it as well as, or better than, the ready-to-eat breakfast food they normally use. The most favorable reaction came from those who lived in the South, although only a very few of these or any of those in the panel identified sweet potato as the dominant flavor. Consumers in low-income groups and those who lived in rural areas were included among the groups that were generally more favorable, and more women liked this breakfast food than men.

Alayam snack, made from sweet potato puree, finely ground coconut, and sugar, has a golden-brown tinge, comes in irregular strip-like pieces a few inches long and is brittle. It has an exceptionally long shelf life but doesn't retain its crispness very well after the package is opened. This new snack appears to be acceptable to a large proportion of our consumers, according to the test, for more than a third of the testing individuals said they would buy

it if it were placed on the market. And nearly a fourth of those in the test indicated that they liked the Alayam snack as well as, or better than, the snack that they normally preferred. Again, consumers from the South, and those with lower incomes, and those living in rural areas were among the groups generally more favorable toward the product, and women generally liked it better than men. Older people liked it better than the younger ones.

Alayam candy is made from the same ingredients as the snack. In the consumer test it stood up best in comparison with brittles and hard candies. But in comparison with all candies, more than 40 per cent of the nation's consumers who took part in the test indicated that they liked this new candy as well as, or better than, the candies they are currently buying or eating. More than a third of those in the test indicated that they would buy it if it were placed on the market. An additional 11 per cent were undecided or failed to give an opinion. A little more than 50 per cent said they would not buy it. More than half, on the other hand, liked the texture or quality, and about a half liked its flavor or taste. By the way, flavors of both the candy and the snack can be varied by blending in other fruits, or by substituting other fruits for the coconut.

Next question is: How attractive will the proposition to make and market these products—one or all—be to manufacturers? Many inquiries have come to the Alabama Station in the short time since the reports were published. They concern the methods of manufacture, availability of the products, and possible recipes. Both trades people and individuals are among the inquirers. Meanwhile, physical research is going forward aimed at overcoming the phases that were criticized by some of the testing consumers. That ought to help a lot.

Pasture Improvement . . .

(*From page* 14)

acre of such mixtures as 0-20-10 or 0-20-20 every four years is suggested. On the more fertile pasture lands, nitrogen fertilizers alone may be used for a period of two or three years before it becomes necessary to replenish the phosphate-potash reserves of these soils.

Our recommendation of nitrogen every year with the suggested treatment of minerals (0-20-20) every third or fourth year just didn't seem to click. Farmers kept right on using nitrogen until their pastures were all "petered out" and then complained that the use of nitrogen fertilizer seemed to have exhausted their soils and that it no longer gave good results. So we said to ourselves last spring, "Why not combine the nitrogen with phosphate and potash in a mixed fertilizer like 10-10-10?"

During the winter of 1950-51, we blazed the State with a publicity program via radio and farm press. The fertilizer industry in turn put on a selling program both through printed leaflets and local dealer publicity. As a net result of all this educational effort and publicity, the fertilizer industry sold an estimated 10,000 tons of 10-10-10 in Wisconsin this past spring. This was enough fertilizer to cover 40,000 acres of pasture with a net increase of at least an extra 50,000 tons of an 18 per cent protein feed (worth a good three million dollars).

To promote an even greater interest in 10-10-10 for pastures, we set in motion the biggest program of field demonstrations with 10-10-10 ever attempted. A total of 213 acre scale plots was set up on farms in some 45 Wisconsin counties. The 10-10-10 was applied at the rate of about 500 lbs. per acre. Small areas of about six square rods each of the fertilized and unfertilized were fenced out and we thus

"preserved the evidence." These enclosed areas were used for field demonstration meetings. Thousands of farmers saw the amazing results at these meetings. Many county agents made good use of these pasture plots for stops on conducted tours which were held in their counties in early summer. And these fenced-out areas also furnished us with yield data. Square-yard harvests were made and total yields calculated to the dry-matter basis. Increases of a ton per acre were common. There were many plots where yields were doubled or trebled and a few where increases were in the ratio of five to one.

Fertilized grass in the June period, we have found, runs as high as 20 per cent in crude protein on the dry-matter basis. The average increase for all plots harvested has figured out to about one ton per acre. Assuming this extra forage to be the equivalent in feeding value of a 16 per cent dairy feed, we show an average return of $65 worth of feed at a cost of $18, or about $3.50 returned for each $1 invested in fertilizer. And, of course, there will be a substantial residual carry-over of the phosphate and potash from these 500-lb. applications of 10-10-10 which should stimulate the growth of legumes next year.

The program has just barely gotten under way. We expect to see Wisconsin farmers buy and apply at least 25,000 tons of 10-10-10 on their pastures this coming spring.

Soil Fertility and Pastures . . .

(*From page* 18)

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Agronomists Recommend . . .

(*From page* 26)

5-10-5, 5-10-10, and the 6-9-9. Doubtless, there is a place for some of these when phosphorus supplies are normal. The 0-1-1 (0-14-14 and 0-20-20) are excellent to increase phosphorus reserves before seeding legumes for instance. However, manure supplemented with superphosphate will serve the same purpose. The 0-1-2 (0-10-20 grade) should supply ample phosphorus as a topdressing if the rate of application is high enough to furnish the amount of potash needed.

Limited supplies of the "discarded" grades will be available, as manufacturers have already started mixing for next season. Of course, some farmers may demand the old high phosphorus grades to the embarrassment of the manufacturer who is doing his best to supply all of his customers with ample fertilizer. Fair play will help everyone and injure none. If the "build-up" of phosphorus is not known, a sample of soil from each area should be carefully secured and tested by the Agricultural College. Tests for phosphorus are now highly dependable.

There is still a need for the use of much more phosphorus on dairy farms. It is recommended that every effort be made to avoid a reduction in the supply of superphosphate, especially for use in stables. However, it appears certain

that reductions in dairy farm use are inevitable unless savings are made in the extravagant use of phosphorus on the intensively grown potato and vegetable crops.

The amount of phosphorus used for tobacco is small, about 1% of the total for New England, and it is secured chiefly from organic materials which are not used for other crops. No reduction seems necessary even though some soils are abundantly supplied; therefore, tobacco fertilization has been excluded from this analysis.

Following the Agronomists' analysis of the current fertilizer problems, they presented their recommendations to representatives of the fertilizer industry for further examination. There were practical problems of manufacture and distribution which had to be considered. In all of this, the industry showed a most cooperative and sympathetic attitude. They too are determined to do their utmost in giving the farmer the best that present supplies permit. They only ask that farmers accept the situation with understanding and make the most efficient use of fertilizer in 1952.

The possibility that many new problems in the manufacture of materials and in transportation might develop overnight cannot be overlooked. The fertilizer industry is closely associated with defense operations and will not be free from seemingly unsurmountable difficulties so long as military demands are high. Such matters as early buying, selection of grades to economize phosphorus, and wise use of all fertilizers are not arbitrary impositions by the industry or by Agronomists, rather, they are a part of National defense.

New U-3 Bermuda Grass Is Crabgrass Competitor

U-3 Bermuda grass, a highly successful turf grass selected at Savannah, Georgia, 13 years ago, can compete successfully with crabgrass in lawns. U-3 could understandably have been named because of its unusual combination of three very desirable characteristics—fine blades, hardiness, and wide adaptability. But the name "U-3" was really only the identifying number used by scientists of the U. S. Department of Agriculture and the U. S. Golf Association. The grass was sent in for identification in 1938 by D. L. Hall, Superintendent of the Savannah Golf Club.

U-3 must have a sunny location to do well, but its resistance to cold has resulted in good turf at Washington, D. C., at State College, Pennsylvania, Cleveland, Ohio, and St. Louis, Missouri, all places well outside the recognized Bermuda belt. The men who have been testing this strain expect it to have its greatest usefulness for lawns, athletic fields, playgrounds, and golf courses in the crabgrass area, for what crabgrass likes, U-3 likes also—lots of sunshine and hot humid weather. In 13 years of observation, insects and diseases have not caught up with it, if well fertilized. The density of its growth keeps down weeds.

Dr. Fred V. Grau describes U-3 as "a lawn grass for the man who cares." It must be mowed and fertilized regularly. It presents other difficulties. It produces no seed, and must be grown from stolons, sprigs, or plugs of sod. However, it can be established without destroying the existing turf. It becomes dormant and brown after the first killing frost, but cool-season grasses seeded into the turf can mask the brown until U-3 is green again.

U-3 grass is now available commercially, but neither the U. S. Department of Agriculture nor the U. S. Golf Association has sprigs for distribution. Either, however, will furnish a list of sprig sellers.

Up-to-date Family Runs Efficient Farm

HIGHER production from family farms of a size to take full advantage of mechanization is one of the most promising possibilities of the years immediately ahead. This prospect emerges in a study of how U. S. agriculture can expand output to meet the national emergency.

In this survey the Bureau of Agricultural Economics is cooperating with the Land-Grant Colleges and other agencies to analyze what happened to make possible increased production during World War II, and how still higher production can be brought about. In the technical journal, Agricultural Economics Research, Jackson V. McElveen reports results of part of the study based on classifying farms by size. Some of the highlights are:

Large farms are now producing nearer to total capacity than most family farms. They are up-to-date, use more advanced technology, and are more nearly balanced. Therefore, these show few opportunities for further increases in efficiency.

During the war an enormous shift took place from small to larger family farms. This shift enabled the larger family farms to take advantage of gains from mechanization.

Recent technological advances, the study shows, have opened amazing possibilities for increased production on family farms that take advantage of new methods. Increased production since World War II is an indication, says McElveen, that many are adopting new methods. Others do not know about them or are not yet convinced that they can afford them.

Increases in production on small and medium family farms during the war, though striking, leave room for improvement. Production levels are lower than on larger farms.

There is doubt, however, that large farm efficiencies continue beyond the point at which the farm gains full advantage of mechanization. Beyond the size of the fully mechanized and up-to-date family farm the problems of hired labor intervene. There is great promise for increasing production on larger family farms making the most effective use of the full possibilities of the family working as an up-to-date productive unit.

Dairy Cow Harvests Her Own

THE dairy cow is a first-class food-processing plant on four legs. This is a fact a farmer may well consider in making plans for treating his productive acres more kindly by a shift to grassland farming, say the U. S. Department of Agriculture.

Dairy scientists have compared the feed requirements of animals in providing the equivalent of a day's food for a man—2,600 calories. The cow and the hog place fairly close with the hog a little ahead in using slightly fewer feed units to supply 2,600 calories of pork products. But the hog requires a diet almost entirely of concentrated feeds—grain and meals. The main item, corn, calls for work in getting it ready for the pork factory—and corn cropping promotes erosion. Only about one-tenth of a hog's diet comes from roughages. The cow in contrast gets three-fourths of her feed units from roughage—pasture, hay, and silage. A cow does much of her own harvesting —and of crops that hold the soil.

Looked at another way, the cow processes into human food, crops that man can not eat. The hog competes with man for grain units that man can use directly.

You'll Remember Yule . . .

(*From page* 5)

grown among us, the greed and the loss of honor and probity in both public and private life. To the careless, the thoughtless, and the selfish ones, such dismal careers suggest adoption of similar ways to get ahead. To such people these unfortunate digressions from decency only spell a desire to imitate and be callous to the shame and unfairness and degenerate motives involved. If one man steals and cheats and gets away with it, why not forget to be honest and decent yourself?

Of course, in everyday life the real answer to all that kind of drivel is the very fact that you associate with so many upstanding and honorable persons, the ones who do the major share of the routine tasks in little stores, service shops, eating-houses, railways and buses, and big institutions.

By and large, these "little people" maintain a rare and very comforting resistance to the cheap and sordid blandishments of all manner of bribery and corruption. Day by day they go to work in rain and shine, often ill and cold and unhappy, but usually doing their duty with pride and nobility of purpose. They are the ones who make ordinary humdrum life run smoothly, who furnish the fuel and the energy, the know-how and the regularity with which a community maintains its poise and completes its tasks. Yes, even if most of them hire out to private firms and corporations, the result is just about the same—"service with a smile."

Right in this connection we also glean good will and cheer from the knowledge that these small fry who really do the world's work in America are accepted as essential and come in for benefits and insurance and pension plans, and get full credit in a public way for their vital importance. The day of throwing away old-age discards and piling up heaps of human wreckage in the wake of industry have gone forever—if we see the trend correctly. Today a new dignity invests the humble servants and laborers in our midst. If the price we pay for inflation is connected with better wages and finer working conditions, then we should pay it and be thankful it is not enforced tithes paid to a despotic overlord. Remember the angels came to announce the first Yuletide when Herod and his nasty minions ruled the universe.

So this is the time of year when we pay devoted homage to the humble people of earth, among them being those old householders and nature's partners who resided up in our old valley. In periods like the present one, when the globe rocks and reverberates with venom and suspicion, it is good to escape mentally from the uproar and the tension to regale ourselves in memory amid those fine old traditions.

How the eagerness to know simple truths and find solace in the everyday things around us makes sharp contrast with the immoral indifference which "high society" in cities often disport themselves at the holiday season! Both they and the valley dwellers afar in the open country are alike aware of the sacrifice and suffering some of our boys undergo in waging this "diplomatic war" abroad—yet one group revels and wastes its substance, while the other in the valley continues to stand firmly for the values and ideals for which our sons have been willing to die.

To refresh our memory, then, let us see if we can remember many of the typical surroundings in those homes in the valley that we shall never behold again—at least not with the ardor and the enthusiasm of lost youth and vanished yesterdays. To do it right, let's pretend we have returned again from our first job away from home, and we stamp off the snow and wipe our overshoes on the welcome mat, bearing

some bundles for Mother when she opens the homestead door.

After the greetings are over and tears of reunion are shed, we glance around to spot the old, familiar evidences of home craft and family comforts gracing that valley haven. The old ingrain carpet is still there, a bit worn and scuffed in spots, stretched tight to the base boards and tacked firmly. Above it, the walls are decked with mail-order paper you helped hang, roses and vines and curlycues long since outmoded. Pictures in walnut frames, deep-set and embellished, look down upon you as of yore—grandsires and grandmothers, aunts and uncles, family groups, and historic views, and maybe that ever-present horse-fair by Rosa Bonheur. That old chromo depicting the surrender of Cornwallis at Yorktown, and the Currier & Ives print of the farm home at Christmas, recall your first beliefs that art was grand and imperishable.

In the room's center is the reading and sewing table, above which is suspended the rose-tinted hanging-lamp whose vivid reflections on the winter walls delighted you when evening came. Reposing on the table are Mother's workbasket and an unfinished pair of woolen socks hitched to the knobby ball of yarn. Beside it are the Bible and a few weekly newspapers and favorite novels.

Just at the side of the room not far from the chairs drawn up to the center table is the sitting-room stove, manufactured, you recall, by a noted iron works at Manitoba. Memories of the cozy warmth it gave to the narrow room are offset a little by equally strong recollections of the bruising job of lifting and tugging it in and out, across shifting layers of newspapers which Mother spread to catch the stray soot gobs knocked from blackened lengths of pipe. And beneath the stove the "zinc" must still repose, with a basket of kindling and a few oak chunks at the rear edge, to keep the home fires burning.

Over there is the narrow doorway leading upstairs, and the next to it at the right is the open door to the aromatic kitchen. To the left inside the kitchen door is a big armchair beneath the clockshelf. The cat usually appropriated that because it held a goose-feather cushion. The family clock is still there, with the big brass key tucked under it. Its yellow face is marred a little by so much time-pointing and ruthless winding. Its "tock" is measured and solemn, in rhythm with the gilt pendulum swinging behind the scrollwork. Its trilly alarm is seldom required now, since Dad is sleeping later than his wont, and the hour you rise to seek your job no longer ever concerns it. But the whizz and buzz that ushers in the hourly striking bell still shows that the old clock suffers from some form of respiratory obstruction of an obscure but not serious kind. It always brings back Mother's recitations of the Longfellow poem, "The Clock on the Stairs." But the echoing words of "Never, Forever" hit you harder than before. For after all, none of our ancient household gods and family altars can compete with the Connecticut clock as harbinger of jolly hours a-coming or reluctant moments of parting too soon to come. In sickness or in health, when infants were imminent or deaths impending, that old unfailing timepiece carried on.

Snapping and cracking with glee at your return, there is the old and ever-hungry kitchen range. Your frequent bouts with it on frosty mornings and the ruddy glow of its grates when its surface got hot enough for battercakes to cook upon are reminders of days before your appetite got jaded with packaged substitutes. You do not pause to enter the current squabble of nutritionists whose modern skills and scientific lore insist that Mother fed you badly with unbalanced diets from that rural laboratory. It's no time to worry about thiamine or riboflavin, calcium or calories. Everyone is entitled to a binge at Christmas, even though it's

just wishful thinking about hungry kids and wishbones and jelly tarts and pumpkin pie. Avaunt, you decriers of homely meals! Haven't I survived and remained stout enough to dream back yonder with keen nostrils and gormandizing gusto?

Walls behind the range are streaked with runny creosote which seeped below the collar fitted to the chimney hole. The corner has a big sink for dishwashing, with a gurgling and wheezy cistern pump on a platform at the end. Near it stood Mother's culinary cabinet and its laden shelves. Here you filched dried apples and brown sugar, and made up that bubbly summer drink of well water, sugar, vinegar, and a dash of soda to make it fizz. Flanking all sides of the kitchen was a four-foot wainscoting, and the eastern outer door had glass at the top, where you drew pictures in the frost on winter mornings.

But why persist in further meanderings, which would lead you to your boyhood bedroom under the eaves, and the catch-all storeroom over the kitchen, and the wide porches toward the front road and the fields? You have passed the test by this time—even to reading old titles of dog-eared books kept in reserve, and labels on the preserves in the cellar closet.

So whistle for your dog again, put on your leggings and arctics, wrap that scarf snugly around your ulster, and wade right out there in the ermine fields—go right back there and feel the nip and the tingle and the zest of it. Then come back and lay it all away again, be alert to make the most of things as they are or boost for things as they should be. Old times and holiday pastorals are like believing in religion. Unless you make them come true today in spirit, their inward value is lost and useless.

And again to all and sundry, may we leave 1952 as we enter it—in peace and in hope, based on the things we have loved and the dreams we have had for future progress and Christian fortitude.

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Save That Soil (Sound, running time 28 min. on 1200-ft. reel.)
Borax From Desert to Farm (Sound, running time 25 min. on 1200-ft. reel.)
Potash Production in America (Silent, running time 40 min. on 400-ft. reels.)
In the Clover (Sound, running time 25 min. on 800-ft. reel.)

OTHER 16 MM. COLOR FILMS AVAILABLE ONLY FOR TERRITORIES INDICATED

South: Potash in Southern Agriculture (Sound, running time 20 min. on 800-ft. reel.)
Midwest: New Soils From Old (Silent, 800-ft. edition running time 25 min.; 1200-ft. edition running time 45 min. on 400-ft. reels.)
West: Machine Placement of Fertilizers (Silent, running time 20 min. on 400-ft. reel.)
Ladino Clover Pastures (Silent, running time 25 min. on 400-ft. reels.)
Potash From Soil to Plant (Silent, running time 20 min. on 400-ft. reel.)
Potash Deficiency in Grapes and Prunes (Silent, running time 20 min. on 400-ft. reel.)
Bringing Citrus Quality to Market (Silent, running time 25 min. on 800-ft. reel.)
Canada: The Plant Speaks Thru Deficiency Symptoms
The Plant Speaks, Soil Tests Tell Us Why
The Plant Speaks Thru Tissue Tests
The Plant Speaks Thru Leaf Analysis
Borax From Desert to Farm
In the Clover

DISTRIBUTORS

Northeast: Educational Film Library, Syracuse University, Syracuse 10, N. Y.
Southeast: Vocational Film Library, Department of Agricultural Education, North Carolina State College, Raleigh, North Carolina.
Lower Mississippi Valley and Southwest: Bureau of Film Service, Department of Educational Extension, Oklahoma A & M College, Stillwater, Oklahoma.
Midwest: Visual Aid Service, University Extension, University of Illinois, Champaign, Illinois.
West: Department of Visual Education, University of California, Berkeley 4, California.
Department of Visual Education, University of California Extension, 405 Hilgard Ave., Los Angeles 24, California.
Department of Visual Instruction, Oregon State College, Corvallis, Oregon.
Bureau of Visual Teaching, State College of Washington, Pullman, Washington.
Canada: National Film Board, Ottawa, Ontario, Canada.

IMPORTANT

Request should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternate dates if possible), and period of loan.

Request bookings from your nearest distributor

One cold, snowy morning an old man was seen, dressed in his nightshirt, vigorously chopping kindling.

His neighbor, amazed at the brevity of the old man's clothing in such severe weather, asked, "How come?"

The old man never missed a lick in his chopping as he replied: "For the last 70 years I have always dressed by a fire, and I'll be dad gummed if I'm gonna stop now."

* * *

Mrs. Young: "Nora, was the butcher boy impudent again when you telephoned your order this morning?"

Nora: "Sure, but I fixed him this time. I sez, 'who the hell do youse think y're talking to? This is Mrs. Young.' "

* * *

In a recent court session a man came before the judge for nonsupport.

Judge—"Have you lived with your wife since July?"

Man—"Naw, suh."

Judge—"Have you contributed to her support since that time?"

Man—"Naw, suh."

Judge—"Well, why haven't you?"

Man—"Well, suh, I'll tell you. I've been married to this woman five years, and last July her conduct got so miscellaneous that I don't think I was eligible to support her any longer."

One night a young Kentucky mountaineer was standing guard at an Army post, when an officer, nearly 7 feet tall, approached.

"Halt!" challenged the Kentuckian. "Who goes there?"

"Major Whate," the officer replied. "Advance and be recognized."

The major approached. The sentry stood at port arms. Suddenly the major's huge arm lashed out and jerked the rifle from the soldier.

"You're one devil of a soldier," the major barked. "Here you are—rendered completely helpless."

"Ah don't know about that," the young mountaineer retorted, and the major found himself looking down the barrel of a .38 revolver which had unaccountably appeared from the soldier's shirt. "All ah kin say, Maj, is that you'd better hand over that rifle. It ain't loaded—but this pistol is."

* * *

We asked the youngster who lives on our street how he was getting along with the new puppy he acquired a couple of weeks ago, and he replied, "He is getting along swell, but he makes puddles on the floor."

"What does your mother do about it?" we inquired.

His reply was startling, "She goes to the bathroom."

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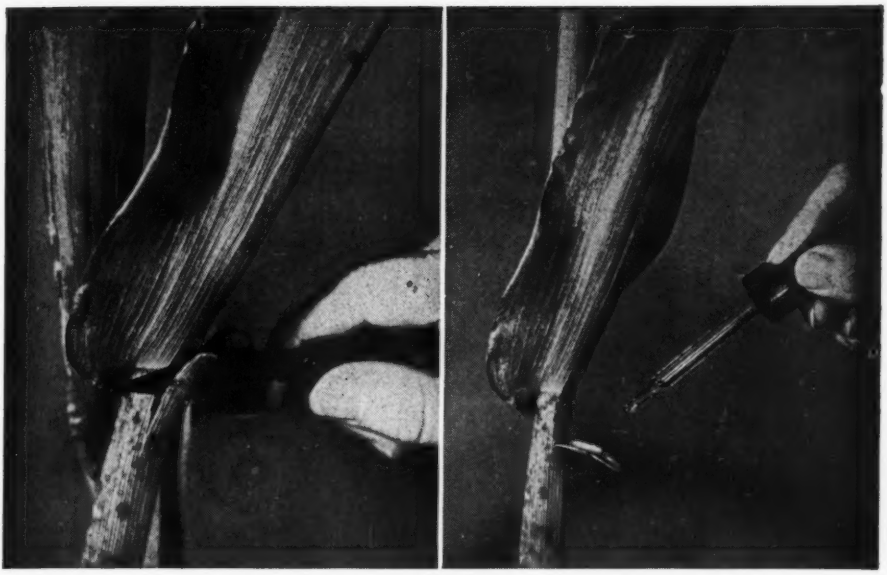

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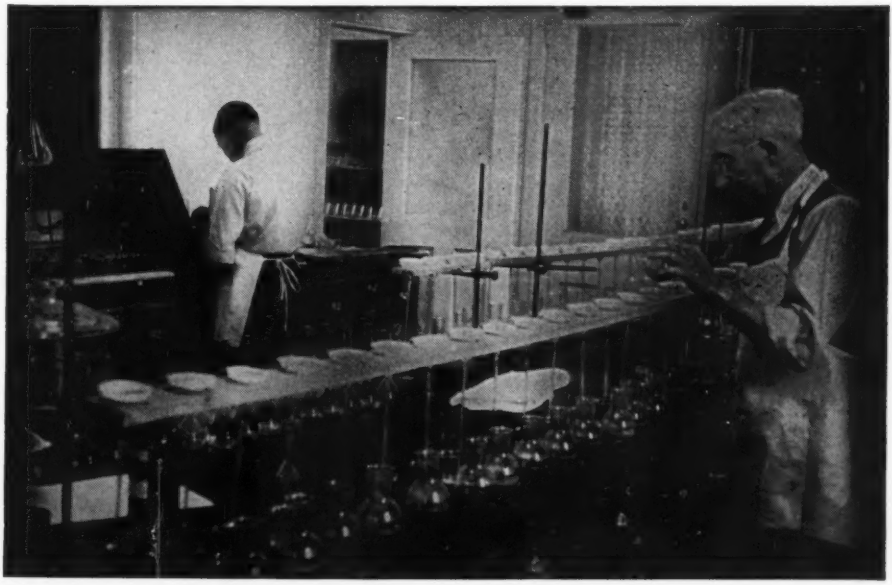

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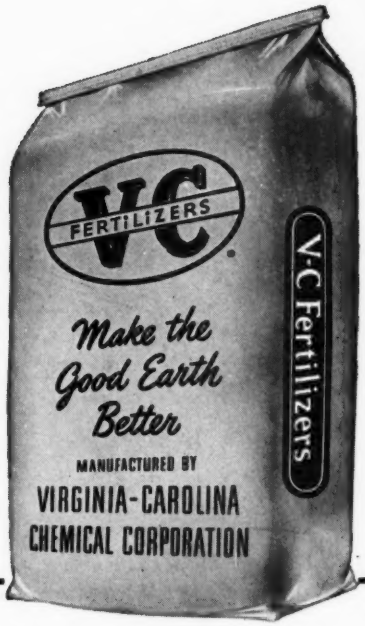

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